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NEW ORLEANS WATER FILTRATION PLANT

GENERAL VIEW OF PLANT, LOOKING DOWN EAGLE STREET FROM MOBILE STREET

By J. W. ARMSTRONG, Engineer in Charge of Construction, Water Purification Plant

THE New Orleans water purification plant is situated at the extreme upper boundary of the city, about three-quarters of a mile back from the Mississippi River, and occupies about sixty-five acres. In order to give a clear idea of the operation of the plant it will be the plan of this article to trace the water from the river, throughout the system. It will make plainer the following description to remember the course the water takes. (See plan on next page.)

After entering the suction main it is picked up by the 40,000,000-gallon centrifugal pumps and discharged through the head house into the grit reservoir, then back through the head house into the lime mixing reservoir, and after traversing its narrow passages re-enters the head house on its way to the coagulating reservoirs. It then passes through the head house for the fourth time on its way to the filters, from which it flows into the equalizing reservoirs and suction well, from which it is taken up by the 20,000,000-gallon high-lift pump and discharged into the distribution system.

INTAKE AND SUCTION LINE

The 48-inch cast-iron suction main is laid level with its invert at elevation 14 Cairo Datum, from a point near the pumps to the crib, a distance of 4,050 feet.

The levee near the intake has its crown at elevation 45, which is about 5 feet above highwater level. Under this levee and extending out to the crib is a duplicate line, put in to provide for future needs. Each line terminates in an inverted bell mouth whose lower edge is about 9 inches below the bottom of the pipe. A 48-inch geared gate valve is placed in each line near the outer toe of the levee.

The fact that these lines are laid about 6 feet below the lowest known water level and about 30 feet below the top of the levee necessitated the use of sheet piling for holding the sides of the trench which would be practically water tight. Six-inch sheeting, from 26 to 34 feet in length, of the Sewall type, was driven and a water-tight connection made with the crib at the end. The crib is 15 by 30 feet in plan, composed of heavy,

closely driven creosoted piles of the Wakefield type. The pipe lines from the inside toe of the levee are supported on piles, and to prevent the possibility of the water following through the levee along the pipe or line of excavation the sheet piling was cut off below the natural surface of the ground and an occasional concrete wall was built across the trench, extending into the earth on each side. The crib was driven tight and during construction it served as a coffer dam. It was so designed that when the openings were cut specially heavy grooved timbers were left between them, which serve as guides for the stop planks.

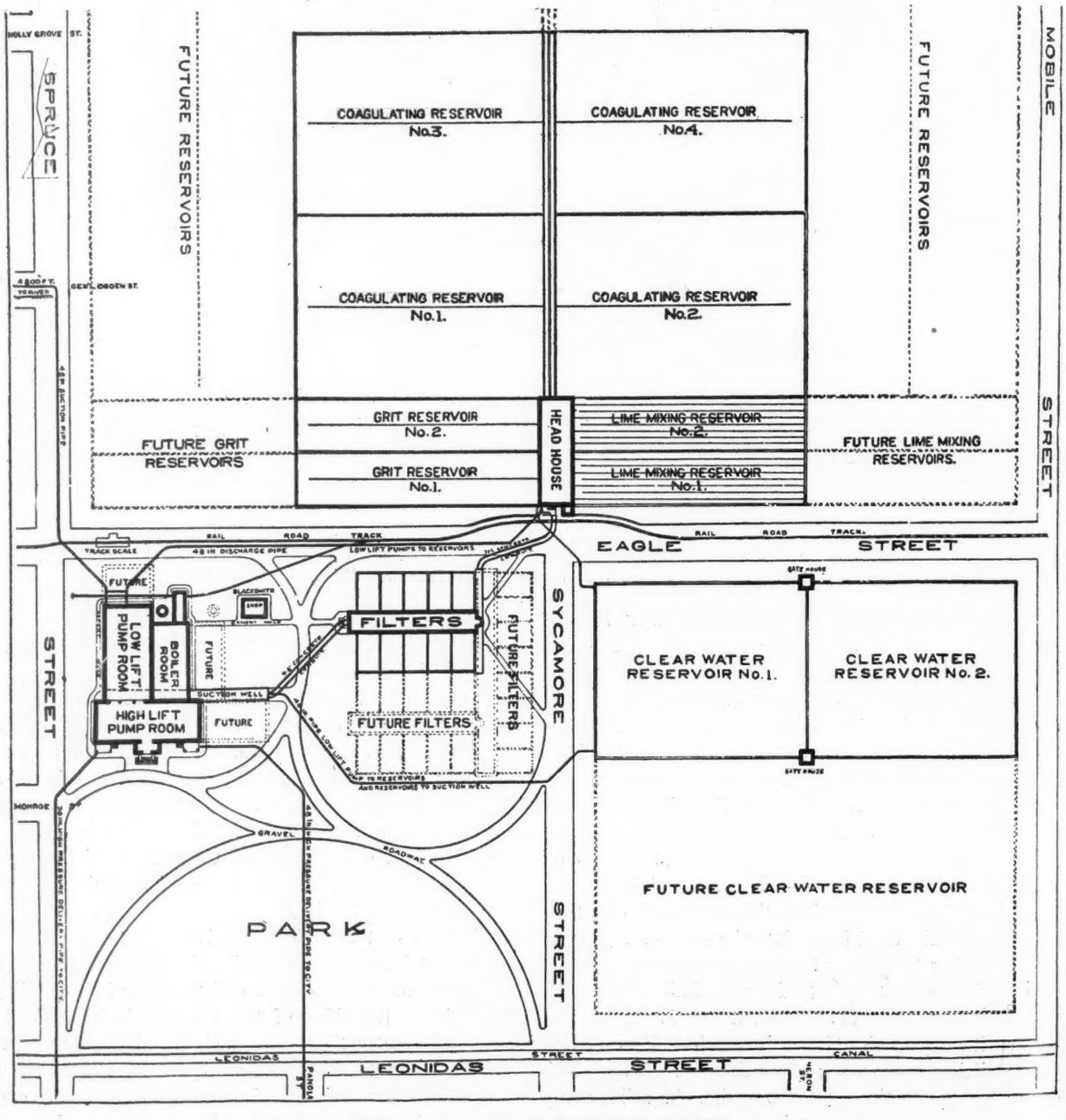
It has been found that water taken from the surface is much freer from suspended matter than that taken from a greater depth, and so stop planks are introduced to enable water to be taken from the surface, as this varies in elevation.

Steel screens 24 feet high, made in two sections, with outer angle frame and ¼ x 3½-inch bars, spaced 1¼ inches on centers, extend the full length of the opening in front of the stop planks. An additional floating screen the full length of the crib enables men to walk upon it to remove drift.

Pumping Station

In the course of ordinary operation it is necessary to lift twice all the water used by the city. The first lift is for putting the water through the reservoir system and is accomplished by any one of three centrifugal pumps, which according to specifications are required to deliver 40,000,000 gallons in 24 hours against a total head of 25 feet when running at a speed not greater than 210 r.p.m. These pumps are operated by horizontal, cross-compound condensing engines.

In order to insure the proper chemical treatment of

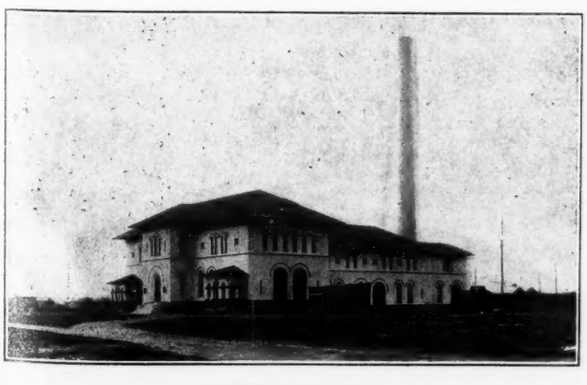


GENERAL PLAN OF PURIFICATION PLANT

water a uniform flow must be maintained, varying only with the consumption, and as this condition prevented the intermittent running of the large low lift pumps, the problem confronting the operating force on starting the plant was to supply the right amount of water and not overflow the reservoirs. This was accomplished by partially closing the valves on the discharge line and opening those of an adjacent pump, thereby allowing a certain percentage of the water to be passed back into the suction lines. At times of very high water the level of the river is above the pumps and it is not necessary to run them, the flow being regulated by throttling the valve on the discharge line.

The pumping station has three main divisions. The low lift room, besides the pumps already described, contains a 20,000,000-gallon centrifugal pump, which takes suction from the clear water well and discharges into the clear water reservoir, and is used only for that purpose; and two 150-k.w. Bullock generators which furnish power for running the small motors lighting the building and grounds, and for operating the trolley system. All are operated by engines similar to those used to operate the 40,000,000-gallon pumps. Ordinarily all steam is exhausted into the large surface condenser on the suction of the high lift pumps Nos. 1 and 2, but an independent condenser is provided in case either of these pumps should be out of service.

The high lift room contains four vertical, self-contained, triple-expansion high-lift pumping engines of the crank and flywheel type, capable when working with a boiler pressure of 165 pounds of discharging 20,000,000 gallons in 24 hours against a 218-foot head. These pumps are designed for a 15 per cent overload and have a guaranteed duty of 170,000,000 foot pounds. Each engine has a surface condenser on its suction line. Those on pumps Nos. 1 and 2 take steam from the low lift room in addition to their own. The suction well is situated between the high and low lift rooms, and each of these rooms contains a 20-ton traveling crane, with a 5-ton auxiliary hoist. The boiler room contains six Heine boilers of 400 h.p. each, carrying an ordinary working pressure of 165 pounds, which are equipped with Ross mechanical stokers. Steam is superheated 110 degrees by Foster superheaters. All feed water is passed through Sturtevant economizers, provision, however, being made for by-passing the economizers. Coal is dumped by bucket conveyors into overhead steel bunkers, and is spouted from the under side of these into traveling weighing hoppers that are easily operated by one man.

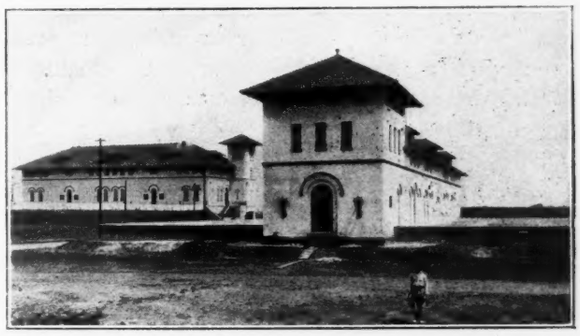


PUMPING STATION

All water entering the reservoirs is passed through a 48-inch Venturi meter, whose recording device contains a sight gage for indicating the rate of flow, an integrating recorder and a recording dial, all enclosed in one case which is situated in the low lift pump room somewhat over 200 feet from the meter.

Head House

The head house occupies, as nearly as possible, a position central to the reservoir system. It is here that all treatment of the water takes place, and that the movement of the water is controlled after leaving the low lift pumps. The water passes four times through the head house, and from the moment it enters the building until it is picked up by the high lift pumps it flows entirely by gravity. The loss of head in passing through the system varies considerably, depending on the conditions of operation. The head house occupies a ground space of 50 x 150 feet, and its lower portion for a height of something over 20 feet is built of reinforced concrete. The subdivisions of the lower part of this building are rather complicated on account of the number of times that the water has to pass through, and the number of by-passes and duplicate portions provided. Most of the walls or partitions are reinforced against water pressure in two directions. The building is so designed that water can be passed through either end, leaving the opposite end free for cleaning or repairs. A centrifugal mud pump, operated by a 100-h.p. motor, is located in the front end of this building. Connecting with this pump is an 18-inch pipe system having openings into each compartment of the head house and each division of the reservoir system. All openings in this line are controlled by sluice gates, operated by wheel stands from the floor above or in the reservoirs from the top of the division wall. At each end of the building there are four rectangular orifice gates of five square feet area each, which are always submerged and through which all water passes on its way to the lime-mixing reservoir. The regulation of these gates is controlled by a single operating stand on the floor above, upon which is an indicator showing the area of the opening below. Within certain limits the operator can regulate the difference in head on the two sides of the orifice gates, varying slightly, of course,



HEAD HOUSE AT LEFT. FILTER GALLERY AT RIGHT

as the flow varies. This difference of head is made use of in an ingenious device, invented by Mr. George G. Earl, which automatically regulates the amount of chemical solution added to the water.

The operating floor is only a few feet above the water level. Here are situated all the stands for operating the various sluice gates, the chemical controllers, the chemical controller regulators, the director's office and the chemical, bacteriological and other laboratories. On each side of the building, running its entire length, is a concrete cantilever gallery, upon which are located a number of wheel stands for controlling various valves and sluice gates.

The upper floor is built of reinforced concrete and is designed to withstand 600 pounds per square foot, including its own weight. All chemicals are at present stored upon this floor, though a separate building will probably be erected for this purpose. The solutions are here prepared in concrete tanks for addition to the water.

There are three lime solution tanks, each 11 feet square and 11 feet deep. Their top edges are 3½ feet above the upper floor, and their bottoms reach to within about five feet of the floor below, upon which they are supported by concrete columns.

Over the center of each tank is a 3-h.p. motor which turns a vertical shaft, upon the lower end of which is a propeller blade, much like those used on small boats. This has proved a very satisfactory device for agitating the lime solution. The lime is slaked and mixed in steel tanks 7 feet in diameter, about 2,200 pounds being one charge. The mixing is done by heavy cast-iron arms that revolve in a horizontal plane at about 10 revolutions per minute. After the slaking has been accomplished the lime is passed into the solution tanks, where it is diluted with cold water and then piped to the chemical controllers. It is not possible within the limits of this article to go into the controller design, but their arrangement is such that, by means of balancing cylinders and hydraulic valves, a head is maintained over an orifice in the controller tank exactly equal to the difference in water level on the two sides of the submerged orifice gates through which the water flows on its way from the grit to the lime-mixing reservoirs. The lime solution is then added to the water automatically in the correct proportion regardless of the volume passing through the gates, the only attention necessary from the director being to see that the orifice is properly set.

The iron and soda mixing and solution tanks occupy the end of the building furthest from the lime tanks. They also are built of concrete, though of smaller dimensions, and there are three of each. The sugar of sulphate of iron is used and is first thrown into the mixing tanks, which have a pipe grid in the bottom through which warm water is forced upward through the iron, dissolving it very rapidly. The iron, as it is dissolved, is drawn into a pipe from the surface into the solution tanks, where it is diluted to the proper density and piped to the chemical controllers, which are similar to those used for the lime solution.

Grit Reservoirs

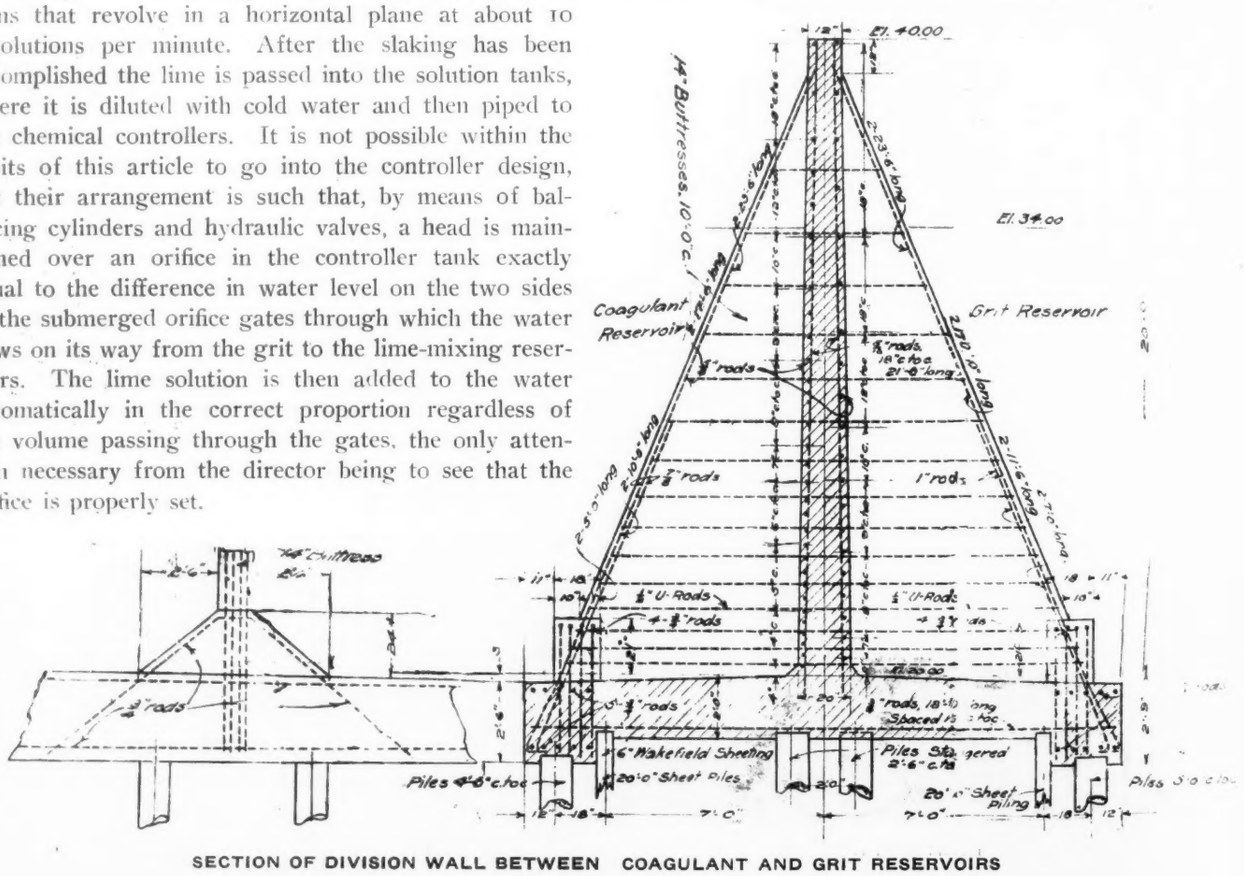
On leaving the head house the water first enters one of two grit reservoirs. The journey through takes about an hour, and during the course the heavier suspended matter rapidly settles out, there being a noticeable difference in the density of the material deposited at the entrance and at the outlet where the water reenters the head house.

Each reservoir is 75 by 150 feet, has outer walls 20 feet high and a maximum capacity of 3,300,000 gallons.

In passing through the head house from the grit to the lime-mixing reservoirs the water flows through the orifice gates, advantage being taken, as has been explained before, of the difference in head on the opposite sides of these gates to automatically control the discharge of chemicals into the water.

Lime-Mixing Reservoirs

These reservoirs are in duplicate and are 75 by 320 feet each, with outer walls 19 feet high. They are



SECTION OF DIVISION WALL BETWEEN COAGULANT AND GRIT RESERVOIRS

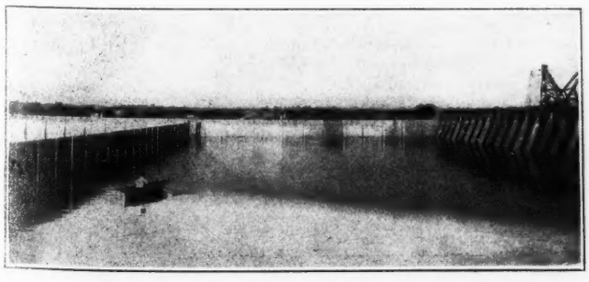
divided by thin partitions, or baffle walls, and an intermediate floor, into 16 rectangular passages, with an area of over 60 square feet each and an aggregate length of about 5,120 feet. When passing 40,000,000 gallons in 24 hours the passage requires about an hour, and the velocity is such that the chemicals and sediment are held in suspension, giving time for the proper chemical reaction to take place before entering the coagulating reservoir. A 5 per cent solution of milk of lime is added to the water as it enters the reservoir, an average quantity of 3.7 grains per gallon having an available value of about 80 per cent being used. An average of 2 grains of sulphate of iron per gallon is used and at present is being supplied at the half-way point, although it was originally intended to be added at the end of the baffle walls in the coagulating reservoirs. For the purpose of further softening the water, provision has been made for adding soda, although none of it has been used as yet. The total capacity of each lime-mixing reservoir is about 2,600,000 gallons.

Coagulating Reservoirs

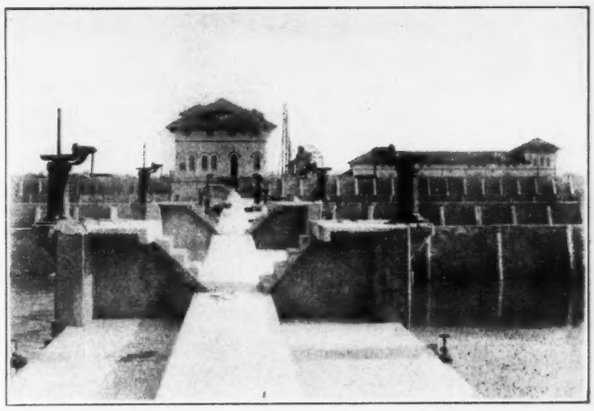
On its way from the lime-mixing reservoir the treated water passes through the head house and through one of two upper openings of 38 square feet each in the division wall between the coagulating reservoirs. These reservoirs, of which there are four, are each about 275 by 325 feet, and have outer walls 14 feet high and hold about 7,500,000 gallons. Each is divided into halves by a baffle wall, at the end of which it was originally intended to add coagulant. Provision has also been made to add a certain quantity of raw water at this point for corrective treatment should there at any time be an overcharge of chemicals. No occasion has yet arisen for its use.

There are two reservoirs on each side of the division wall, with a 60 by 60-inch sluice gate between them. This makes it possible to use them singly or in series, the time for settlement being about 3½ hours if used singly and 7 hours if used in series. The water is finally passed over a skimming weir, through the lower passage of the division wall, into the head house and then through a reinforced concrete conduit 7 feet in diameter to the filters. Provision is made for adding coagulant to the water as it enters the 7-foot conduit should it be found desirable to do so at any time.

Any or all reservoirs can be put out of service for cleaning or repairs and can be by-passed, with this exception, that if the lime-mixing reservoirs are used the water must also pass through the coagulating reservoir.



COAGULATING RESERVOIR



DIVISION WALL BETWEEN COAGULATING RESERVOIRS

Filters

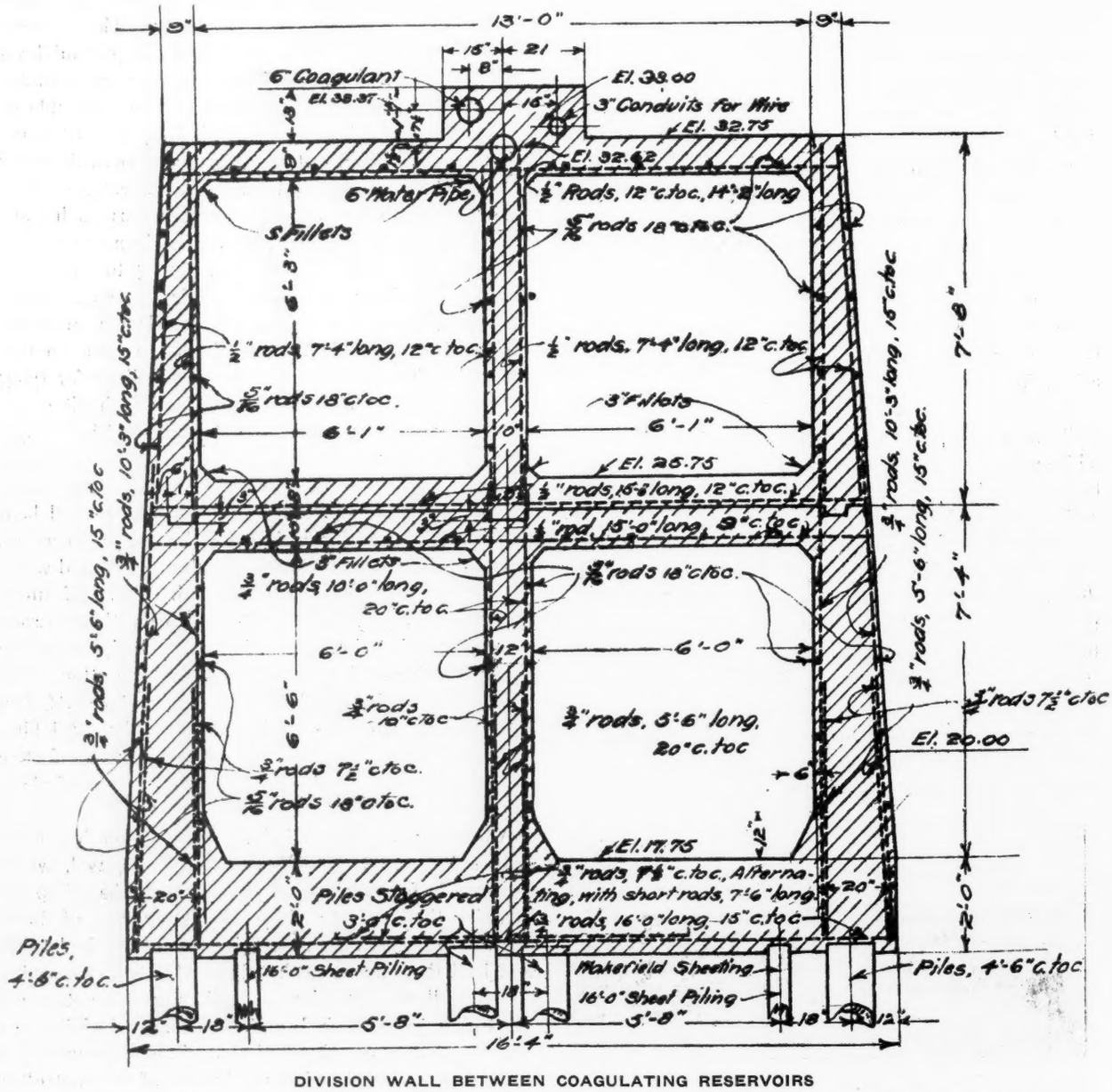
The filter gallery building is about 29 feet wide and 180 feet long. Its extreme lower portion acts as a conduit for filtered water. Above this is the pipe gallery. Above the pipe gallery is the operating floor, and above that are the wash water and air tanks. The extreme depth of excavation is 13 feet below the ground level and 37.5 feet below the center of the wash water tanks. There are 10 filters, five of which are on each side of the building. Each unit has a filtering area of 1,431 square feet, divided into halves by a central gutter 4 feet wide, and has eight lateral wash water gutters, 6 feet 7½ inches center to center, across each half. The gutters, 16 inches wide, are made of cement mortar reinforced and have sloping bottoms 15 to 21 inches deep. They have proven of ample capacity. Each filter is 53 by 31 feet inside. The walls are 12 inches thick and 12 feet high. The filters are open on top, except for the cross walks, which are utilized for tying in the walls and making them stable. Each filter was cast at one pouring, which was accomplished in a single day. The filters are supported on concrete groined arches, which form the roof of the equalizing reservoirs. These are about 6 feet 6 inches deep and hold 866,000 gallons. The weight of the entire structure, including the water, is carried on piles. A settled water passage extends across the rear of the filters, of ample capacity to supply future filters. From this passage the water is led through a riveted steel pipe onto the filters, which are fed through the center gutter. The sand bed is 3 feet thick and has its surface 2½ feet below the crest of the wash water troughs. All filter sand was taken from Horn Island and has an effective size of 32-36 mm., and a uniformity coefficent of about 1.65.

A brass screen, made of No. 20 wire, 10 meshes to the inch, separates the sand layer from the gravel, which is placed in four different layers in the V-shaped spaces between the concrete ridge blocks on top of brass strainer plates. Under the strainer plates are the laterals that lead the effluent to the pipe system which supplies the controllers. The filter controllers are the outgrowth of studies by Mr. Earl, and the same principles that were applied to the chemical controllers were used. A circular orifice is placed in the bottom of the controller,

and the head built up in passing through this orifice is used as a basis for operating heavy balanced cylinders, which are nearly submerged in water whose level varies as the head over the orifice varies. The controllers can be operated at a fixed rate, but ordinarily they are operated to respond to the pumps and are so regulated that the filters are discharging at their maximum rate when the water in the suction well is at a minimum, and will shut down entirely when the water reaches a certain predetermined maximum level. Their operation has been very effective, and, so far as the writer is informed, are the only controllers known that respond to pumps.

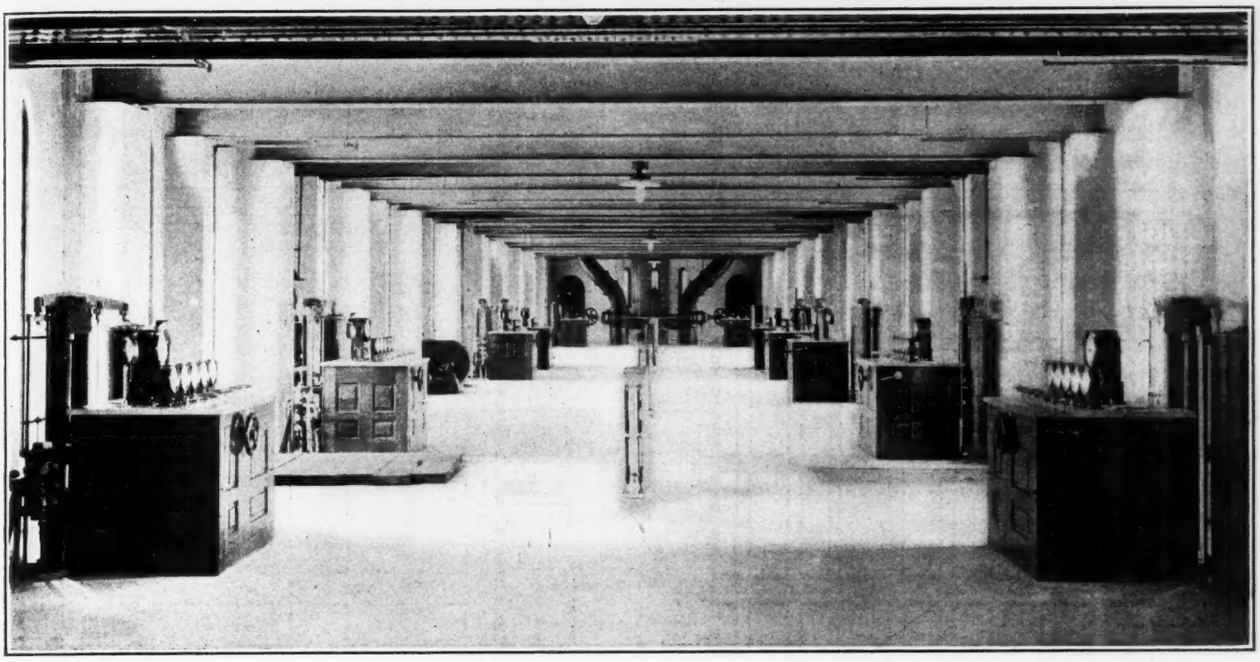
In designing the filters it was decided to omit the use of air for washing, and use a larger volume of water than had been previously used. The average wash lasts for about three minutes, and water is passed upward through the sand at about 40,000,000 gallon rate. As this is about double the rate of delivery from any of the high lift pumps, or equal to the full capacity of a low lift pump, it was impracticable to supply wash water at the above rate from any of the pumps in constant service. To meet the needs of the situation two large steel tanks, holding about 120,000 gallons, were erected on beams in the filter gallery. These tanks are filled by water from the distribution system, which is passed through a 10-inch Venturi meter which registers each wash on a recording chart. The wash water tanks are made strong enough to withstand the full pressure of the large pumps and when empty contain about 16,000 cubic feet of air, which when they are filled is compressed into a smaller tank supported by the roof trusses above. This air is supplied to the head house, where it is used for agitating the iron and soda solution; and it is planned to admit it back into the wash water tanks through a reducing pressure valve to boost up the pressure in the wash water, but satisfactory results have been obtained without its use.

The filters have been operated at from one-half to



DIVISION WALL BETWEEN COAGULATING RESERVOIRS

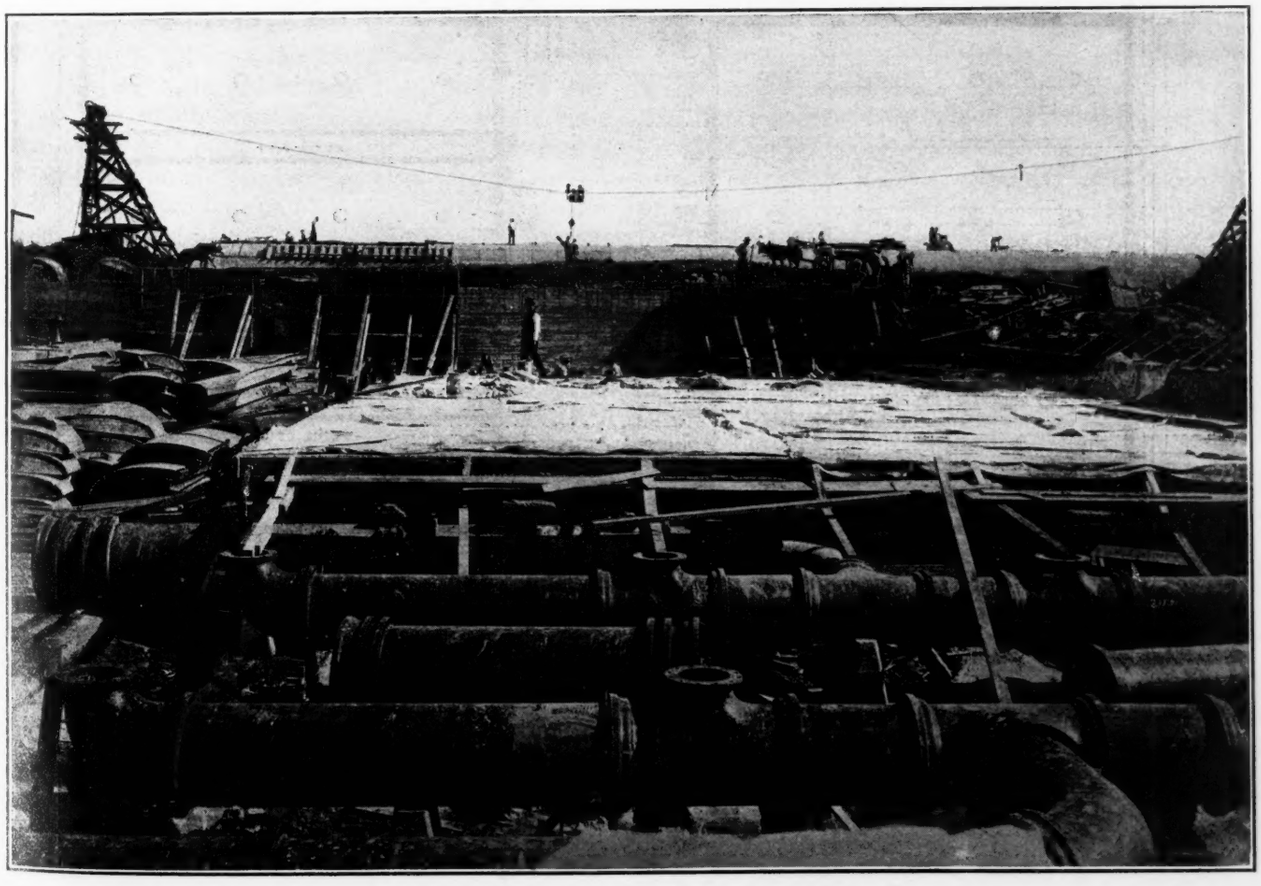
Upper conduits carry outgoing treated water to coagulating reservoirs. Lower conduits carry settled water to filters



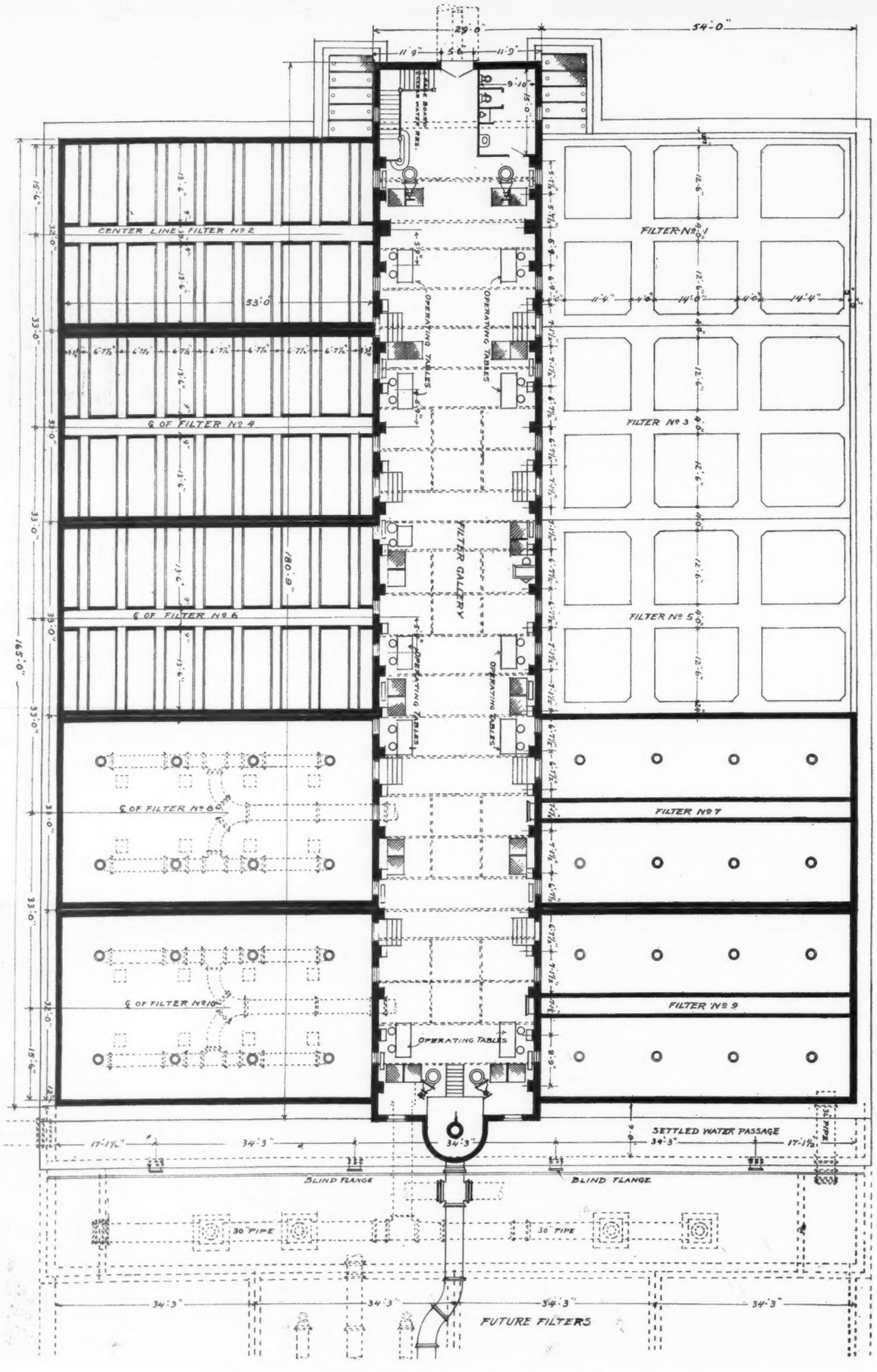
FILTER GALLERY, SHOWING OPERATING TABLES

three-quarters their rated capacity, although they have been tested at all rates, from zero to above the normal, with satisfactory results. Runs of from 40 to 50 hours between washings have been made without showing any deterioration in the quality of the effluent. For three months about 2½ per cent of wash water was used, though for April it was somewhat less.

All valves for controlling the filters are hydraulically operated from the filter gallery floor. There are 10 regular operating tables, each containing 5 levers for opening and closing valves, and 5 indicating dials to show the distance that the valves are open; a loss-of-head gauge, a gauge to show pressure in wash water tanks, and a faucet from which samples of filter effluent are drawn. Back of each operating table are the balancing cylinders of the filter controller.



ARRANGEMENT OF PIPING UNDER FILTERS



GENERAL ARRANGEMENT OF FILTERS AND FILTER GALLERY

INTERIOR OF CLEAR WATER RESERVOIR

Clear Water Reservoirs

In order to provide a reserve supply in case of sudden demand, there are two clear water reservoirs, covered to prevent the growth of algæ. They occupy the best portion of two city squares and hold about 7,500,000 gallons each. The roof is of elliptical groined arches, supported on concrete columns 12 feet on centers, and the side walls are arched to take the thrust of the roof. The reservoir walls are reinforced on the outside with an earth embankment, having a 2½ to 1 slope, and their tops are covered one foot deep with earth. There is a 48-inch main connecting the reservoirs with the suction well, and the 20,000,000-gallon centrifugal pump used for filling the reservoir. Connecting with the main at one end of the suction well is a 48-inch balanced relief valve that, when the water in the well drops below a certain elevation, will automatically open and allow water from the reservoir to enter the well, and when its normal level is again reached will automatically close.

In General

Most of the buildings were built as near the surface of the ground as structural conditions would permit, there being nothing to be gained by excavating, as the ground in this locality will sustain its greatest load at the natural surface.

The reservoir walls and all buildings of any size are built on piles, driven to a sand stratum a little over 40 feet below the surface.

Over 60,000 cubic yards of concrete were placed in the work, and most of it was reinforced. The concrete for engine and building foundations was a 1:3:6 mixture, and for all beams and for all reservoir walls or tanks required to withstand water pressure, a 1:2:4 mixture was used. No provision other than careful mixing and placing was attempted for making the concrete impervious. Slow setting cement, requiring an hour or over for initial set and about eight hours for hard set, was used.

A good clear white but rather fine sand that came from the northern short of Lake Pontchartrain, and washed gravel taken from the Mississippi River near Prophet's Island, were used.

The reinforcement was mostly of plain square rods, manufactured by the open hearth process, having an elastic limit of from 36,000 to 44,000 pounds a square inch. The method of construction necessitated the partial embedding of rods in concrete, leaving the remainder exposed to the air for a considerable length of time. These rods were often bent to the ground by the workmen, or by a swinging concrete bucket, but being of mild steel were easily straightened.

The Mississippi River water at New Orleans contains an extremely fine clay that it is impossible to settle out in any reasonable length of time, and during high water carries considerable fine sand. Its turbidity varies from a mean minimum of 125 parts to a mean maximum of 1,500 parts per million, averaging 600 parts per million, with a turbidity coefficient of about 1.08. The alkalinity of the water varies from 60 to about 175 parts per million, averaging 100 parts per million. The free carbonic acid varies from 0 to 60 parts per million. The magnesium varies from 5 to 15 parts per million, averaging about 9 parts, and bears a very well defined ratio to the alkalinity, approximately 9 per cent, with only about 5 per cent variation. The incrustants, calculated as calcium carbonates, vary from 10 to 100 parts per million.

The filtration of water was not started until February 6, 1909, and since then the conditions of operation have been rather severe, owing to the fact that the water was pumped into an entirely new distribution system containing nearly 500 miles of pipe, and after operating for a short time with a very small number of consumers the mains of the old company were connected with the new system. As it was not safe to subject the old mains to full pressure of the new pumps a 30-inch reducing pressure valve was put in, and all water fed to the old system passes through it. It was necessary to cut a 30-inch main under pressure in order to place this valve.

Any information given at this time as to costs or methods of operation cannot be considered final as the operation has not yet passed its experimental stage.

Mr. Geo. G. Earl, General Superintendent of the Board, had entire charge of construction, and all work was done under his direction. Messrs. Hering & Fuller, of New York, are the consulting engineers. The writer had direct charge of preparation of plans and construction. Mr. H. F. Webb was resident engineer. Mr. John L. Porter is director in charge of operation, and has furnished the facts regarding the treatment of the water. Mr. A. B. Wood is in charge of the power plant.

The Allis-Chalmers Company, of Milwaukee, Wis., furnished and erected the pumping machinery. Black & Laird, Ltd., were the general contractors for the plant, and the Roberts Filter Company, of Philadelphia, put in all controllers and filter devices.

WATER WORKS OF THE UNITED STATES

Information from Three Hundred and Fifty Plants Obtained Especially for This Issue—Methods of Purification —Use of Meters—Abuse of Fire Hydrants—Tabulation of Data and Synopsis of the Same

During the past few weeks we have obtained, through the courtesy of hundreds of water works officials, information concerning their water works practice. Most of their replies were necessarily confined to the briefest possible statements; but concerning the use of fire hydrants several longer expressions of opinion have been received. These informants represent, it is believed, a sufficient percentage of all the plants of the country to be fairly typical of all. A synopsis of their replies is as follows:

Sources of Supply

Of 46 New England plants (10 did not report the source of supply) 3 obtained the supply wholly from rivers and 2 partly; 2 obtained the supply wholly from springs and 2 partly; 7 obtained the supply wholly from brooks and one partly; 17 wholly from lakes and ponds and 3 partly; 8 wholly from wells and 2 partly, and 4 wholly from impounding reservoirs and one partly. In this list, as in others, it is probable that many of those reporting the supply as being from brooks could with equal correctness have said impounding reservoirs.

In the Middle Atlantic States 11 reported the supply as coming wholly from rivers and one partly; 7 wholly from lakes and one partly; 8 wholly from springs and 10 partly; 13 wholly from wells and 5 partly; 9 wholly from brooks and 10 partly, and one partly from an impounding reservoir.

In the South Atlantic States 8 obtained the supply wholly from rivers; 2 wholly from springs and one partly; 9 wholly from wells and one partly; 5 wholly from brooks and 2 wholly from impounding reservoirs.

In the Ohio Valley States 20 obtained the supply wholly from rivers, 5 wholly from lakes and one partly; one wholly from springs and 4 partly; 40 wholly from wells and 6 partly; one wholly from brooks, 2 wholly from impounding reservoirs and one partly, and 2 wholly from infiltration galleries.

In the Upper Mississippi-Missouri States 16 obtained the supply wholly from rivers, 8 wholly from lakes, 5 wholly from springs, 37 wholly from wells and one partly, one wholly from an impounding reservoir and one partly, and one from an infiltration gallery.

In the Lower Missouri and Gulf States 5 obtained the supply wholly from rivers, one from springs, 12 from wells, one from an impounding reservoir and 2 from brooks.

Of the five cities in the Rocky Mountain States, 2 obtained the supply from springs, 2 from mountain streams and one from a tunnel.

Of the 10 cities on the Pacific Coast, 2 obtain their supplies from rivers, one partly from springs and partly from wells, 2 wholly from wells, one from a brook, 2 from impounding reservoir and 2 from mountain streams.

Of the 9 Canadian cities 3 obtain the supplies from rivers, one from a lake, 2 from springs, 2 from wells and one partly from wells and partly from a creek.

Purification

Of methods of purification, slow sand filtration leads in New England with 7 plants, one reports mechanical filters and one precipitation.

In the Middle Atlantic States, 7 plants employ slow sand filtration, 4 of them employing some preliminary treatment, also. Six employ mechanical filters, 4 of these using preliminary treatment. One uses precipitation only and 4 use it as a preliminary treatment. Two use sedimentation only and 5 use it as a preliminary treatment. One uses a submerged sand filter for removing sediment.

In the South Atlantic States 4 slow sand filters are reported, 2 of these being preceded by a preliminary treatment. Five mechanical filters are each preceded by a preliminary treatment. Two plants employ precipitation only and 5 use it as a preliminary treatment. Sedimentation is employed as a preliminary treatment by 4 plants. One employs aeration and one sterilization.

In the Ohio Valley States slow sand filtration is employed in 8 cities, 5 of them preceded by some preliminary treatment. Ten plants employ mechanical filters, all but one being preceded by preliminary treatment. Precipitation is used as preliminary treatment by 12 plants and sedimentation by 6, the latter being employed as the only treatment in 3. Aeration is used in combination with other treatment in 2 cities and as the only treatment in one. At one plant softening is employed in combination with other treatment.

In the Upper Mississippi-Missouri States slow sand filtration is employed in 5 cities, 3 of them in connection with preliminary treatment. Mechanical filters are employed in 3 cities, 2 in connection with preliminary treatment. Precipitation is employed as a preliminary treatment in 5 cities, in connection with sedimentation in 4 others, and as the only treatment in one. Sedimentation is employed as a preliminary treatment in 6 cities. Aeration alone is used in one city. Fifty-four report no treatment whatever.

In the Lower Mississippi and Gulf States slow sand filters are reported in one city only. Mechanical filters are used in 4 plants, preceded by preliminary treatment. Precipitation is used as a preliminary treatment in 4 cities and sedimentation as an additional treatment in 3; each of these being employed as the only treatment in 2 cities. Fifteen report no treatment whatever.

Of the 5 Rocky Mountain States 2 report no treatment, one slow sand filtration, one sedimentation and one both of these. Of the 10 Pacific Coast cities one employs a rapid filter in combination with preliminary treatment, one precipitation, one sedimentation and one aeration, each in combination with other treatment, and 2 use sedimentation alone. Seven report no purification.

Of the Canadian cities slow sand filtration is employed in one, rapid sand filtration preceded by precipitation and sedimentation in one, precipitation only in one, and sedimentation only in one, and 5 report no treatment.

In addition to regular purification a number of cities in all sections of the country have employed sulphate of copper as a treatment for algæ in open reservoirs. The number of plants reporting the use of this were as follows: In New England 4 plants, one reporting good success, 2 excellent and one not entirely satisfactory. In the Middle Atlantic States 9 report its use with good success, one with "splendid" success, one no success and one that the effect was not lasting; a total of 12 plants out of 62. In the South Atlantic States the success of its use is reported as good in one city, thoroughly good in one, excellent in 2, very satisfactory in one and very beneficial in one. In the Ohio Valley States the material has been used in 5 cities of the 76 reporting; in 2 with good success, one fair, one partial and one not stated. In the Upper Mississippi-Missouri States 4 cities report its use, one with very good succes, one poor success and 2 not specified. In the Lower Mississippi and Gulf States its use is reported in 8 cities, 3 reporting good success, one fair, one very satisfactory and 2 poor. No cities in the Rocky Mountain States reported its use. In the Pacific Coast cities 3 report using it, one with the best possible results, one most satisfactory and one poor. None of the Canadian cities reported its use.

An article and letters in another part of this issue give some further information concerning the use of copper sulphate.

Water Rates and Meters

We endeavored to determine to what extent the water works plants of the country were furnishing free water to the cities. We have considered as free water that for which no payment was made or credit given which resulted in a financial return to the department or company, and the cities included in the list are those which furnished no free water for any purpose, not excepting fires. Of such cities the following numbers were found in the reports: In New England, 9 out of 56. In the Middle Atlantic States, 8 out of 62. In the South Atlantic States, 5 out of 30. In the Ohio Valley States, 4 out of 76. In the Upper Mississippi-Missouri States, 13 out of 70. In the Lower Mississippi and Gulf States, none. In the Rocky Mountain States, none. In the Pacific Coast States, one out of 10. In Canada, 3 out of 9.

Perhaps the most extreme case is Hudson, N. Y., where not only is water furnished free for city use, but there is no charge whatever to domestic consumers; nor is there any special water tax, but all is paid out of the general taxes. An act of Legislature requires the city of Detroit, Mich., to pay the Water Department $75,000 per year, prescribing that this can be used only for interest and sinking fund purposes.

The Clinton, Mass., Water Department charges the town the same as private parties, the town paying cash for the water used except that for flushing sewers. The Holyoke, Mass., Water Department is paid by the city for all water used for any purpose. The municipal buildings are metered.

The percentage of cities using meters was found to be very high, although those having all services metered are comparatively few. The following table gives the percentages of metered services in the several districts:

Percentages of All Services Which Are Metered

District	Number of Cities in which the Percentages of all Services Metered is							
	100		50 to 100		Less than 50		No Meter	
	Mun.	Pri.	Mun.	Pri.	Mun.	Pri.	Mun.	Pri.
New England	3	0	16	0	21	2	10	4
Middle Atlantic	4	2	4	1	20	11	11	9
South Atlantic	2	0	7	3	8	4	4	3
Ohio Valley	8	0	12	5	22	16	10	3
Upper Mississippi-Missouri	15	0	17	5	18	11	3	1
Lower Mississippi & Gulf	1	0	2	7	3	1	5	2
Rocky Mountain	0	0	0	0	4	0	1	1
Pacific Coast	1	0	2	0	4	3	0	0
Canada	0	0	1	0	8	0	0	0
Total	34	2	61	21	108	48	44	23
Per cent of all	13.8	2.1	24.7	22.3	43.8	51.1	17.7	24.5

One of the questions asked concerning meters was the average life before they reached the scrap heap. In answering this many cities very properly replied that it was not necessary for a good meter to go to the scrap heap at all if it was kept in repair and the wornout parts replaced. In a number of cities, however, especially small ones and those where no facilities are provided for repairing meters, a meter is allowed to run until it ceases to be at all useful as an accurate measuring instrument, and is then discarded. In answering this, the length of time given might have referred either to this actual wearing out of unrepaired meters, or to the average length of life of the working parts before renewal is necessary. In New England such length of meter was given as 5 years by one correspondent and as more than 20 by 7, the average life reported being about 18 years. In the Middle Atlantic States one reported the minimum life as 6 years and three as more than 25, the average being about 18 years. In the South Atlantic States, one reported the minimum life as 3 years and two as 15, the average of all being about 11 years. In the Ohio Valley States one reported the minimum life as 4 years and one as 50, the average being about 13 years. In the Upper Mississippi-Missouri States two report the minimum life as 5 years and one as 25, the average being about 14 years. In the Lower Mississippi and Gulf States, two report the minimum life as 10 years and one as more than 20, the average being about 17 years. On the Pacific Coast one reports the minimum life as 8 and one as more than 18, the average being about 13 years. Of the Canadian cities, two report the minimum life as 8 years and one as more than 15, the average being about 12 years. From these figures which, as stated above, are somewhat indefinite as to meaning, it would appear as though, under the least favorable construction, a meter is good for from 12 to 20 years with proper attention and repairing. As explained above, it is probable, however, that a con-

servative interpretation of the answers would justify considering these replies to mean that the average meter is good for from 10 to 15 years without repairing or before any considerable repairs are necessary; and that if kept in repair its life could be set at from 25 to 50 years.

Certain of the water works superintendents and other officials contributed additional data on this point beyond the mere estimated life. In Clinton, Mass., meters more than 20 years old are in use. Meters are tested, cleaned and repaired every four years. Lowell, Mass., has meters in use which were set in 1882 and 1884. Asbury Park, N. J., has over 1,600 meters in service, some of which have been in constant use for more than 20 years, and none have yet gone to the scrap heap, but are all registering within 3 per cent correct. Sandy Hill, N. Y., reduces waste by a standing reward of $100 for proof of any wilful waste.

James B. Young, Superintendent of Public Works of Holland, Mich., states that the average life of a meter "depends on the meter. We have some in use 12 years which are still good; but we had others give out in a year." J. H. Miller, Water Commissioner of Grand Island, Neb., gives the life of meters as from 6 months to 6 years before needing repairs, according to make of meter. Superintendent of Water Works John B. Heim, of Madison, Wis., states that the life of a meter "depends upon the meter. Some meters that were placed in 1885 are still in use and doing good work; but others have found the scrap pile long ago."

In Detroit, Mich., the use of meters began in about 1888, and by 1898, with a constantly increasing population, the total amount of pumping per annum had fallen from 14,380,166,670 gallons to 14,278,682,058. Since then the per capita consumption has not decreased, because the installation of meters has not been proportionate to the growth of the city, being installed principally on the services of factories and other users of large quantities of water.

One of the chief advantages of meters, and possibly the reason which most frequently leads to their adoption, is the desire to cut off waste and unnecessary use of water. (In spite of popular opinions to the contrary, we doubt whether there are any actual instances where legitimate consumption has been reduced by their use.) The accompanying table contains a list of 123 cities, which are all of those which gave information concerning the actual effect of meters in reducing consumption. Of these cities, 14 report no reduction in consumption, although 8 of them have over 10 per cent of the services metered. Many of them, however, report that the consumption has not increased, and this to a certain extent may be placed to the credit of the meter, since it is the general tendency of per capita consumption in all cities to increase unless some effort is taken toward stopping waste. In the remainder, a reduction of per capita consumption of from very little up to 50 per cent is reported, quite a number giving the latter figure. It is very probable that in the majority of cases the amount of reduction is more or less an estimate, as indicated by the fact that figures given as representing

RESULTS FROM METERS

Town	Per Cent of Services Metered	Reduction in Consumption	Remarks
Dover, N. H.	52	33%	No increase in total consumption, though 5,000 in population.
Somersworth, N. H.	30	20%	
Brookfield, Mass.	10	None	
Chicopee, Mass.	24	20%	
Leominster, Mass.	55	Consid'le	
Clinton, Mass.	88	50%	From 80 gals. to less than 41; Domestic, 16.
Holyoke, Mass.	12	37%	From 160 gals. per cap. to 100.
Lowell, Mass.	75	35%	From 86 gals. per cap. to 56.
Spencer, Mass.	90	25+%	
Hartford, Conn.	100	20%	
New Britain, Conn.	25	....	No particular reduction.
Lynn, Mass.	40	....	Consumption holds down to 70 gls.
Maynard, Mass.	88	Ab't 5%	4 gallons per cap. per day.
New Bedford, Mass.	32	None	Consumption holds down to 84 gls.
North Attleboro, Mass.	100	....	Consumpt'n down to 49 gals. per capita.
Provincetown, Mass.	30	....	Good effect; percentage of reduction unknown.
Somerville, Mass.	40	None	Consumption holds stationary.
Swampscott, Mass.	91	31%	Consumption from 68 gals. per capita to 47.
Taunton, Mass.	48	None	Introduction gradual.
Waltham, Mass.	10	Little	
Bristol, R. I.	2½	None	
New London, Conn.	16	Slight	
Norwalk, Conn.	1	None	
Albany, N. Y.	19	None	Consumption has steadily increas'd
Reading, Pa.	10	None	Meters mostly on business and Mfg. services.
Cortland, N. Y.	50	50+%	
Dunkirk, N. Y.	94	50%	
Homer, N. Y.	19	....	Reduction not great.
Jamestown, N. Y.	24	20%	
Little Falls, N. Y.	12	20%	
Rochester, N. Y.	85	None	Consumption held at about 90 gals.
Saratoga Springs, N. Y.	90	....	Consumption reduced 125 gals. per capita.
Walden, N. Y.	100	46%	
Whitehall, N. Y.	25	25%	
Asbury Park, N. J.	100	40%	
Atlantic City, N. J.	80	50%	
Camden, N. J.	7	20%	
East Orange, N. J.	9.5	None	Meters used chiefly on bus' serv'c's.
Chester, Pa.	20	35%	
Corry, Pa.	40	25%	
Freeland, Pa.	12	Very lit'e	
Meadville, Pa.	45	....	No increase in pumpage for 8 yrs., but great increase in population.
Meyersdale, Pa.	2	Not noticeable	
Oil City, Pa.	65	30%	
Reynoldsville, Pa.	5	Slight	
Wilmington, Del.	28	None	
Charlottesville, Va.	10	20%	
Richmond, Va.	56	15%	
Bluefield, W. Va.	53	50%	
Edenton, N. C.	5	Not noticeable	
Salisbury, N. C.	75	50%	
Winston, N. C.	60	Very material	
Greenwood, S. C.	80	50%	
Akron, O.	30	V'y slig't	Small reduction due to increasing factory consumption.
Cleveland, O.	94	41%	From 170 gals. per capita to 100.
Dayton, O.	92	35%	
Delaware, O.	60	50%	
Eaton, O.	60	20%	
Findlay, O.	100	33⅓%	
Gallipolis, O.	75	None	
Kent, O.	30	Not noticeable	
Mansfield, O.	25	30%	
Marietta, O.	10	Not noticeable	
Shelby, O.	25	Greatly	
Warren, O.	38	50%	
Brazil, Ind.	75	50%	
Fort Wayne, Ind.	30	10–15%	
Huntington, Ind.	80	33⅓%	
Plymouth, Ind.	25	Very l'tle	
Richmond, Ind.	50	Ab't10%	Consumption reduced 16 gals. per cap. per day.
South Bend, Ind.	15	None	
Winchester, Ind.	15	A little	
Alton, Ill.	40	20%	
Aurora, Ill.	100	50%	
Belleville, Ill.	90	....	Present consumption, 32 gals.
Bloomington, Ill.	95	40%	
Elgin, Ill.	50	25%	
Lincoln, Ill.	28	50+%	
Mattoon, Ill.	33⅓	Consid'le	
Rock Island, Ill.	16	Consid'le	
Sterling, Ill.	75	20%	
Covington, Ky.	100	12%	Consumption reduced from 65 gals. per cap. to 57.
Newport, Ky.	27	25%	Consumption reduced from 80,000 gals. per tap to 60,000.
Memphis, Tenn.	34	5%	
Mitchell, S. D.	100	Very material	
Detroit, Mich.	9	....	Consumption decreased during 10
Lansing, Mich.	33	25%	yrs. though population increased
Ludington, Mich.	50	30%	
Muskegon, Mich.	33	25%	
Ypsilanti, Mich.	35	25%	
Cloquet, Minn.	100	25%	
Mankato, Minn.	90	30%	
Minneapolis, Minn.	77	50+%	
Moorhead, Minn.	95	50%	
De Pere, Wis.	Ab't 12	20%	
Madison, Wis.	99	Ab't50%	Consumption reduced 55 gals. per capita per day.

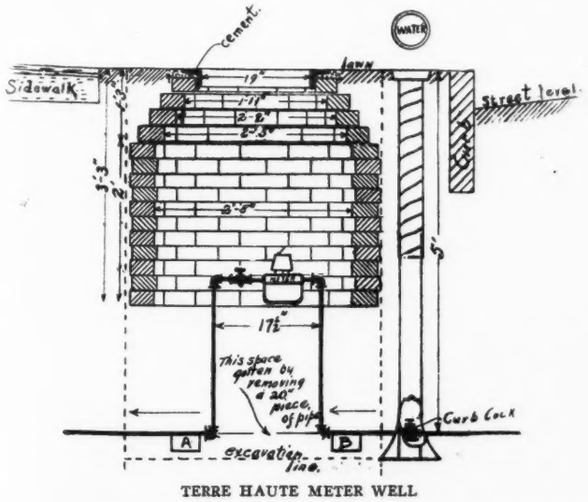
RESULTS FROM METERS—Continued

Town	Per Cent of Services Metered	Reduction in Consumption	Remarks
Cedar Falls, Ia.	55	Ab't20%	
Cedar Rapids, Ia.	50	50%	
Cherokee, Ia.	100	Material reduc'n	
Fairfield, Ia.	50	1%	
Mason City, Ia.	100	40%	
Oelwein, Ia.	99	33%	
Sioux City, Ia.	100	50%	
Lincoln, Neb.	100	30%	
York, Neb.	80	40+%	
Moberly, Mo.	47	2%	
Abilene, Kan.	15	None	
Ft. Scott, Kan.	60	25%	
Lawrence, Kan.	60	30%	
Topeka, Kan.	65	....	Consumers increase but pumpage does not.
Shawnee, Okla.	99	33%	
Ft. Smith, Ark.	20	25%	
Houston, Tex.	10	....	Consumption reduced 3 million gals. per day.
Weatherford, Tex.	50	50%	
Raton, N. M.	25	20%	
Evanston, Wyo.	33⅓	None	
Aberdeen, Wash.	12½	Marked	
Baker City, Ore.	100	50+%	
Los Angeles, Cal.	55	51%	Consumption reduced from 300 gals. per cap. to 148.
Brantford, Can.	4	Ab't40%	Reduction applies only to metered services.
London, Ont.	3	Inappreciable	
St. Catharines, Ont.	3	50%	Reduction applies only to metered services.
Winnipeg, Man.	74	Material	

the reduction are multiples of five or ten. The fact, however, that most of them give these as between 25 and 50 per cent furnishes almost unanimous testimony to the apparent effectiveness of meters in abolishing waste of water.

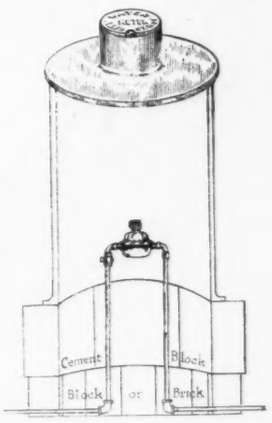
Meter Wells

The Terre Haute Water Company sets its meters between the curb and sidewalk, inside a well the construction of which is shown in the illustration. The finished well is 3 feet 3 inches deep, the meter being just above the bottom. The excavation is carried to the level of the service pipe, approximately 5 feet, being made 3 feet 6 inches in diameter. The service pipe is carried up by vertical risers to the level of the meter, approximately 2 feet, a horizontal section including the meter and cock connects with another riser which is carried down to the same level, whence the service is continued into the premises. This construction brings the meter connection about 2 feet 10 inches below the ground level. Bricks are placed at A and B, close to the risers, to prevent settling. After the meter has been connected up the excavation is filled in up to the level of the bottom of the meter, the ground being thoroughly tamped to prevent settling. The brick wall is built from here up, rising 2 feet vertically with a diameter of 2 feet 8 inches, from which point it is drawn in to a circle 20 inches in diameter. A cast-iron cover is imbedded in cement spread upon the top course and is forced down into this to the proper sidewalk level. The material required for this construction consists of 185 brick and about 25 pounds of cement.



TERRE HAUTE METER WELL

Painsville, O., for ⅝-inch meters uses 18-inch flanged sewer crocks about 26 inches deep, resting on cement blocks 8 inches high and 4 inches thick, made to a 9-inch radius so that five complete the circle. These rest in turn on 4-inch cement blocks or on bricks. On top of the crock rests a cast-iron cover manufactured for the Clark meter box. The meter is raised on a vertical offset of the service pipe to within 22 inches of the face of the cover. For larger meters larger crocks are used. "We depend on the radiation of heat from the earth to prevent freezing," says Superintendent O. W. Kile. "We never have had a meter freeze in this setting, although the winters for the past three years have been very mild, the longest cold spell being 10 days of zero weather. We have confidence enough in them to keep on setting them in this manner."



CURB METER BOX

The use of sewer pipe for meter wells, with minor variations in details, appears to be quite general.

Hydrants

The use of hydrants more or less indiscriminately by others than members of the Fire Department was the subject of an inquiry made to the various cities. The following table gives the number of cities in the various districts reporting that no other departments were permitted to use the hydrants; that hydrants could be used by others only by special permission or in the presence of an inspector; that the Street Department only is permitted to use fire hydrants. Also the replies of various superintendents who were asked their opinion as to whether the use of fire hydrants by other than members of the Fire Department was objectionable.

Use of Fire Hydrants

District	Number of Cities Reporting Fire Hydrants are Permitted to be Used by						Number Considering the Practice			
	Fire Dept. Only		Special Permission		St. Dept. Only		Objectionable		Unobjectionable	
	Mun.	Pri.	Mun.	Pri.	Mun.	Pri.	Mun.	Pri.	Mun.	Pri.
New England.	16	3	6	1	10	0	26	2	6	1
Middle Atl'tic.	10	10	4	2	19	5	17	8	12	5
So. Atlantic...	4	3	2	1	6	6	7	2	6	4
Ohio Valley...	12	7	5	1	24	9	26	14	17	5
Upper Miss...	15	6	0	0	14	5	20	10	17	1
Lower Miss...	3	6	0	0	6	5	4	6	3	1
Rocky Mt....	0	0	0	0	1	0	2	0	0	0
Pacific Coast..	1	0	1	0	2	1	4	0	3	0
Canada.....	3	0	1	0	3	0	3	0	6	0
Totals.....	64	35	19	5	85	31	109	42	70	17

INFORMATION CONCERNING WATER WORKS SYSTEMS

SOURCE OF SUPPLY, PURIFICATION AND FINANCIAL

MUNICIPAL PLANTS

Name of City	Source of Supply	Method of Purification	Financial		
			Water Furnished Free to City	Any Credit Given	Hydrant Rental
New England:					
Dover, N. H	Springs	Slow sand filter, removing iron.		$4,000 for all city purposes; ¼ of a'm't used.	
Keene		None	Fire, street sprinkling, watering troughs, flushing sewers.	No	No.
Lancaster	Brooks, mountains	None	Drinking fountains, flushing sewers, street sprinkling, fire.		
Manchester	Lake Massabesic	None	Street sprinkling, sewers, watering troughs		$25 per hydrant.
Somersworth	Salmon Fall river	Slow sand filter	City Hall building	No	$30 per year.
Montpelier, Vt	Berlin Pond	None	Hydrants, st. sprinkling, water tubs, sewers	No	No
Rutland	Mountain brook	None	All public city buildings	No	No.
Arlington, Mass		None		$7,000 for all purposes.	
Boston		None	For all purposes	No	No.
Brockton	Silver Lake	None	Fire, fountains, sewer flushing	No	No.
Brookfield	Wells	None	9,000 gallons to shoe factory	No	No.
Cambridge	Brooks and pond	None	All water used by Departments	No	No.
Chicopee	Brooks fed by spr'gs.	None	Flushing sewers only	No	No.
Clinton		None	Flushing sewers only		$25 per annum.
Concord	Sandy pond	None	For all public purposes	No	No.
Danvers	Pond	None	All purposes, except electric light plant	No	No.
Fall River	Lake	None	28.48% of consumption in 1908; for all purposes.	No	No.
Gardner	Crystal Lake	None		Pays $6,800 for all departments.	
Holyoke	Ponds	None	None		$8 per year.
Leominster	Fall	None	None		Yes.
Lowell	Driven wells	None	Drinking fountains, park, st. and swr. work	$5,000 for public bldgs.	No.
Lynn	Artificial pond	None	All the city uses	No	No.
Maynard	White pond	None			No.
Middleboro	Large well	None		$15,000 a year	No.
Monson	Collecting well	None	All town purposes	No	No.
New Bedford		None	All purposes	No	No.
Newburyport	River, wells and spring.	Slow sand filter		$5,000 for all public purposes.	
Newton	Ground water	None	Sewer flushing, street construction	For public bldgs. and street sprinkling.	No.
North Attleboro	Covered wells	None	None		$40 each per year
Peabody	Ponds	None	None		Yes.
Provincetown	Wells	None	None		$25 per hydrant.
Somerville	Impounding reserv'r	None	For all municipal purposes	No	No.
Spencer	Natural lake	None	All water free	Approp., $5,000 a year.	No.
Springfield	Springs and surface water.	Slow sand filter (in summer only).	Estimated at $56,932; all municipal purposes.	Credited on Dept. books only.	Included in a'm't of free water.
Swampscott		None	Part of fire hydrants and street sprinkling		
Taunton	Lakeville ponds	None	Fire protection, street sprinkling, sewer flushing, street and sewer construction.	For public buildings and cemeteries.	No
Waltham	Ground water	None	10% of consumption or about 80,000,000 gals.	No	No.
Watertown	Impounding reservoir.	None	Fire service	All munic. Depts. pay for water used.	No.
Winchester		None	All departments, schools, drinking fountains	No	No.
Winthrop	Impounding reservoirs.	None	Hall Grand Army post		$3,000 per year for 157 hydrants.
Worcester	Several	None	Street sprinkling and fires, 120 mil. gals. yrly.	No	No.
Hartford, Conn		None	Only for park fountains	No	$15 per year.
New Britain	Brooks and wtr. sh'd	None	For all city purposes	No	No.
New London	Storage reservoir	None	Public schools, hospital, public buildings, fire hydrants.	No	No.
Norwalk		None	Fire hydrants, library	No	No.
Norwich	Springs	None	Fire service	No	No.
South Norwalk	Stream	Slow sand filter, double aerating.	Hydrants (120) municipal electric plant, fire houses.	No	No.
Wallingford	Ponds	None	Street sprinkling	No	$515 for 96 hyd'ts
Waterbury		None	All purposes	No	No.
Winsted	Crystal Lake	None	Fire hydrants and street department	No	No.
Middle Atlantic:					
Albany, N. Y	Hudson river	Sedimentation, slow sand filter, rapid sand filter.	Fire and all public buildings	No	No.
Binghamton	Susquehanna river	Sedimentation, precipitation by coagulant.	All city and school buildings, street sprinkling.	No	805 hydrants free.
Buffalo	Lake Erie	None	None	City pays for all water.	$15 per yr. Repairs and care for them in winter.
Cohoes	Mohawk river	None	½ mil. gals. per day; all city depts., pub. schools	No	No.
Dunkirk	Lake Erie	None	All public bldgs., fountains and sprinkling	No	No.
Gloversville	Springs, mt. streams	None	All public buildings	No	No.
Homer	Driven wells	None	4 churches, watering trough, public schools, fountains, Home for Aged Women, library, street sprinkling.	No	No
Hoosick Falls	4 wells	None	4 hose houses and municipal buildings	No	$3,000 per year.
Hudson	Stream	Sedimentation, slow sand filter.	Free to every one except commercial users	No	No.
Jamestown	Artesian wells	None	385 fire hydrants, 115 flush tanks	$12,000 per year	
Johnstown	Streams and springs.	None	Schools, library, drinking fountains, City Hall, fire hydrants.	No	No.
Little Falls	Streams and springs	Slow sand filter	Churches, flushing streets, etc	No	$6,000 per year.
Malone	Springs	None	None	Yes	Yes.
Mechanicsville	Springs	None	Fire houses, sewer flushing, fountains		
Middletown	Streams and springs.	Precipitat'n by coagulant, mechanical filters, gravity and pressure.	About $12,000 for hydrants and public bldgs.	No	No.
Newburgh	Washington Lake	None	No record	No	No.
North Tonawanda	Niagara river	None	Flushing sewers, public bldgs., schools, fire houses and hydrants.	Amount of interest on water bonds.	
Olean	Wells	None	Fire protection, city buildings, libraries	No	No.
Plattsburgh	Adirondacks	None	Schools and city buildings	No	No.
Rochester	Hemlock Lake	None	Estimated 1,000,000 gallons per year	No	No.
Saratoga Springs	Brooks and springs.	None	12,000,000 gals.; standpipes, sewers, churches, schools, public buildings, fires.	No	No.
Walden	Artesian wells	None	Two drinking fountains only	No	$25 each.
Whitehall	Creek	None	Two drinking fountains, flushing sewers	No	No.
Yonkers	Impound'g reservoir, wells and river.	Slow sand filter, aerating		$5,000 for municipal	No.
Asbury Park, N. J	Artesian wells	Removing iron by rapid filters.	$6,000 for metered water, sprinkling and fires purposes.	No	No.

MUNICIPAL PLANTS—Continued

Name of City	Source of Supply	Method of Purification	Financial		
			Water Furnished Free to City	Any Credit Given	Hydrant Rental
Middle Atlantic, Con.					
Atlantic City, N. J.	Lake and artesian wells.	Not necessary	Fire, street sprinkling, hospitals, city bldgs.	Reasonable compensation.	Yes.
Bordentown	Springs	None	Public schools, firehouses		$600 appropriation
Burlington	Delaware River	None	Schools and fire department	No	No.
Camden	Artesian wells	None	All public buildings, drinking fountains, schools, fire hydrants.	No	No.
East Orange	Artesian wells	None	75,000,000 gals. per year for sewer flushing, public buildings, street sprinkling.	No	No.
New Brunswick	Laurence Brook	None	None		$50 per year
Allentown, Pa.	Springs	None	$15,316; churches, schools, city buildings, fire, street department.		No.
Bradford	Springs	None	$15,000; flushing sewers, public schools, drinking fountains, city buildings	No	No.
Franklin	Wells and spring	Precipitat'n by coagulant rapid sand filter.	None	Yes	Yes.
Meadville	24 wells	None	$7,000 per year for hydrants, flushing sewers, city buildings, hospitals.	No	
Oil City	Drilled wells	Natural filter	Schools, city buildings, fire hydrants, street flushing, amounting to $10,000.	No	No.
Reading	Springs and creek	Slow sand filter	Value $28,000, flushing and sprinkling streets, city and school bldgs., charity institut'ns, fire	No	No.
Titusville	Artesian wells	None	5 school bldgs., 115 fire hydrants and city hall.	No	No.
Wilmington, Del.	Brandywine Creek	Sedimentation, slow sand filter.	Schools, engine houses, public buildings, street sprinkling.	No	
South Atlantic:					
Washington, D. C.	Potomac river	Sedimentation and slow sand filter.	About 30%	No	None.
Baltimore, Md.	Jones' Falls and Gunpowder river.	None	One-fourth of whole consumption or about 15,000,000 gals. a day.	No	Co. pays $25 each for those beyond city limits.
Cumberland	Potomac river	None	Free for all purposes	No	None.
Charlottesville, Va.	Mountain stream	None	Two million gallons annually	No	None.
Manchester	James river	Coagulant	Public schools and sprinkling streets	No	$3,665.00.
Pulaski	Deep wells	None		Yes	
Richmond	River		Fire and street sprinkling	No	
Fairmont, W. Va.	Gravity	Slow sand filter	Fire department only		
Piedmont	Gravity	None	One fountain		
Edenton, N. C.	Two Artesian wells	None	Three public watering fountains	No	
Salisbury	Crane creek	Rapid sand filter	20,000,000 gals. per annum	No	None.
Winston	Frazier's creek	Sedimentation, precipitation by coagulant, rapid sand filter.	Hydrants, flush tanks, fire fighting, public buildings.	No	None.
Greenwood S. C.	Deep wells		8,000,000 gals; public fountains, sprinkling streets and flushing sewers.	Charged to city, never collected.	Free.
Orangeburg	Two bored wells	None		$4,365	
Americus, Ga.	Deep wells and sp'gs.	None		$7,225.66	108 hydrants, at $40 each.
Atlanta	Chattahoochie river.	Precipitation by coagulant, rapid sand filter.	Two-fifths of water pumped	No	None.
Elberton	Creek	Sedimentation, precipitation by coagulant, slow sand filter.	City hall, schools, sewers, public fountains, fire hydrants.	Yes	
Newman	Springs	None		Dept. credited with all water.	None.
Rome	River	Precipitation by coagul't.	$10,000 for all city and school purposes	Will be paid in future.	None.
Valdosta	One 8-inch well	None	Public bldgs., 6,610,000 gals.; drinking fountains for horses, 4,000,000; sanitary, 14,000,000; fire, 1,000,000; st. sp'k'g, 2,000,000.	No	None.
Jacksonville, Fla.	Artesian wells	None	None	Each dept. pays for water used.	$30 per year per hydrant.
Ohio Valley:					
Ashland, O.	Wells	None	Schools, orphans home, fountains	No	None.
Bellevue	Storage reservoirs and wells.	None	100,000 gals. daily	No	106 fire hyd'ts free
Canal Dover	Wells	None	25,366,000 gals	No	None.
Canton	Wells	None	Fire, washing sts., sewer flushing, parks, city buildings, schools, churches.	No	None.
Celina	Wells	None	Five drinking fountains, 123 fire hydrants	No	None.
Cleveland	Lake Erie	None	By meter 756,908,500 gals., or 3.84%; unmetered, 768,119,500 gals., or 3.90%.	No	None.
Columbus	Scioto river	Precipitation by coagulant, rapid sand filter, softening.	$40,000 worth, for all municipal uses	No	None.
Coshocton	Infiltration wells	None	30,000 gals.	No	None.
Dayton	Artesian wells	None	Schools, municipal bldgs., parks, flush tanks.	No	None.
East Cleveland	City of Cleveland	None	None		Yes.
Eaton	Wells and springs	None	Schools, public bldgs., St. Dept.	No	No.
Findlay	Springs and wells	None	Fire, schools, public bldgs., parks, st. cleaning	No	No.
Gallipolis	Ohio river	Slow sand filter	Schools, 5 churches, city hall, fire dept.	No	No.
Hicksville	Wells	Not any	Fire, city hall and street fountains	No	No.
Mansfield	Springs and wells	None	25,000 gals., schools, fountains, troughs and hospitals.	No	No.
Marietta	Ohio river	Precipitation by coagulant; rapid sand filter.	Electric light plant, city bldgs., fire hydrants, public schools.	No	No.
Niles	Wells	None	Fire, sprinkling, schools, flushing sewers	No	No.
Norwalk	Impounding reserv's	Sedimentation	Schools, fire dept., city offices	No	No.
Oxford	Wells	None	Street sprinkling, public buildings	No	No.
Painesville	Lake Erie	Slow sand filter	105 fire plugs, 5 school bldgs., library, hospital, engine house, city elec. light plant.	No	No.
Reading	Deep wells	None	8,000,000 gals., st. sprinkling	No	No.
Springfield	Wells	None	20,000,000 gals.	No	No.
Toledo	Maumee river		$70,316.39 worth	No	No.
Toronto	Ohio river	None	Horse trough, flushing sewers, city buildings, churches, schools.	No	No.
Versailles	8 drilled wells	Not any	City building, school board, fountain	No	No.
Brazil, Ind.	Drilled wells	None	98 fire plugs, 3 city bldgs., 6 school bldgs., 4 churches, 1 factory.	No	No.
Brookville	White Water river	None	Public watering troughs and fire protection	No	No.
Crown Point	Wells	None	Schools, churches, fire dept.	Yes	Yes.
Evansville	Ohio river	Rapid sand filter	City hall, schools, parks, fire dept.	No	No.
Fort Wayne	Wells	None	Parks, public schools, public bldgs.	No	No.
Garrett	Wells	None	Fountains, city hall, 53 fire plugs	No	No.
Hammond	Lake Michigan	Sedimentation	Fire department		
Huntington	Wells	Slow sand and rapid sand filter.	Public schools and library	No	Yes.
Marion	Deep wells	None			No.
Mishawaka	St. Joseph river	None	20,000,000 cu. ft. per year	No	No.
Plymouth	Deep wells	None	Fire protection and flushing sewers	No	No.
South Bend	Artesian	None	$87,500 worth	No	No.
Aurora, Ill.	Artesian wells	None	30% of total pumpage	No	No.
Bloomington	Wells	None	Parks	No	No.
Canton	2 deep wells	None	Fire service	No	Yes.

MUNICIPAL PLANTS—Continued

NAME OF CITY	Source of Supply	Method of Purification	FINANCIAL: Water Furnished Free to City	FINANCIAL: Any Credit Given	FINANCIAL: Hydrant Rental
OHIO VALLEY.—Cont.					
Charleston, Ill	Ambraw river	None	Normal school	No	No
De Kalb	Wells	None	Street sprinkling, city bldgs., flushing sewers	No	
Elgin	Artesian well		$2,000 worth	None	$10 each.
Rock Island	Mississippi river	Slow sand filter, sulphate of aluminum.	Sewer and street Department parks, fountains, schools, fire hydrants.	No	No.
Sycamore	2 deep wells	None	5 school houses, hospital, conservatory, 2 fountains, trough, 3 flush tanks.	No	
Covington, Ky	Gravity	Sedimentation	22,015,575 gals. of water free; parks, buildings, hospitals, fountains.	No	No.
Danville	Dix river	Sedimentation, precipitation by coagulant, rapid sand filter.	All purposes	No	No.
Newport	Ohio river	Sedimentation, aerating.	100,000,000 gals. free; schools, public buildings, fire and sewers.	No	No.
Bristol, Tenn	Spring by gravity	None	None		$30 each for hy'ts.
Clarksville	Cumberland river	Precipitat'n by coagulant, slow sand filter.	None		Yes.
Jackson	Wells	None	Fire, sewers, washing streets, public buildings, drinking troughs.	No	No.
Memphis	Artesian wells	None	1 billlion gallons, fire hydrants, parks, sewers, city buildings.	Pays $25,000 per annum, or ¼ value.	No.
UPPER MISSISSIPPI-MISSOURI:					
Mitchell, S. D	Wells	None	City Hall, public schools	No	No.
Battle Creek, Mich	Goquac Lake	None	Parks, fountains, schools, public buildings, fire and street department.	No	No.
Detroit	Detroit river	None	All public purposes; 7.8%	$75,000 for interest and sinking fund purposes	No.
Greenville	9-inch wells	None	Schools, city hall, watering troughs, fire hyd'ts	No	No.
Holland	Ground	None	Very little	No	No.
Houghton	Springs	None	None	No	No.
Ishpeming	Lakes		18,000,000 gals per yr.; all city purposes		No.
Lansing	Wells, rock	None	None	$22,000 for drinking fountains, fire protection, and st. sprinkli'g.	
Ludington	Lake Michigan	None	None	$8,000 for all water furnished.	$40 per year.
Manistee	Wells	None	None	Pays 5c. per 1,000 gals. for water used on sts.	$10 per annum.
Marquette	Lake Superior	None	Sprinkling sts., flushing sewers, Fire Dept	No	No.
Muskegon	Lake Michigan	None	200,000,000 gals.; cemeteries, parks, public buildings.	By paying interest on water bonds.	
Port Huron	Lake Huron	None			No.
Ypsilanti	Wells	None	Fountains and parks	No	No.
Cloquet, Minn	Spring lake	None	Fire purposes only	No	
Duluth	Lake Superior	None	None	Paid for at regul'r rates	$50.
Faribault	Wells	None	All public purposes	No	No.
Mankato	Artesian wells	None	$10,360; street sprinkling, city hall, library	City pays $3,338.33 interest on w. w. bonds.	Yes.
Minneapolis	Mississippi river	Reservoirs	Parks, police station, fire hydrants, street sprinkling, schools, public buildings.	No	No.
Moorhead	Red river	None	None	All water paid for	$30.
New Ulm	Wells	None	None	Credited for all water used by city.	$30.
Owatonna	Deep wells	None	$5,500 per annum; sewers, fire protection, hospital, library, city hall, jail.	For pub. schools and street sprinkling.	No.
Baraboo, Wis	Springs	None	Fire hydrants and all public buildings	No	No.
De Pere	Artesian wells	None	400,000 gals. a year; schools and public bldgs.	All above 400,000 gals.	$50.
Eau Claire	Wells	None	All public buildings		
Ft. Atkinson	Well	None	None recorded		Yes.
Madison	9 artesian wells	None	Street sprinkling, sewers, street work, public buildings, charitable institutes.	No	No.
Rice Lake	Well	None		Yes	Yes.
Waukesha	Deep wells	None	None	Meters on all depts	$30.
Cedar Falls, Ia	Springs	None	St. sprinkling, fire protection, flushing sewers, schools.	No	No.
Cedar Rapids	Cedar river	Precipitat'n by coagula't, slow sand filter.	Hydrants, city bldg., street sprinkling, parks	No	No.
Cherokee	Deep wells				No.
Eldora	Deep wells	None		Yes	Yes.
Fairfield	Artificial lakes	None	All municipal purposes	No	No.
Glenwood	Deep wells	None	Fire service and public watering trough	No	No.
Mason City	Deep wells	None	Public grounds and buildings	No	Levy for hydrant service.
Muscatine	Gravel water	None	Hydrants, city hall, parks	No	No.
Oelwein	Wells	None	4 public schools and parochial	No	No.
Osceola		Rapid sand filter	None	Supplied at cost of pumping.	No.
Sioux City	Driven wells	None	All free to city	No	No.
Beatrice, Neb	Big Blue river	None	Sanitary sewers and fires	No	No.
Grand Island	Wells	None	None		Yes.
Hastings	3 deep wells	None	Flushing, 150 fire hydrants and fountains	No	No.
Lincoln	Wells	None	230 million gallons; fires, flush tanks, city parks, fountains, city bldgs., street sprinkling	No	No.
Fulton, Mo	2 deep wells	None	Fire hydrants, sewer and street flushing	No	No.
St. Louis	Mississippi river	Sedimentation, precipitation by coagulant.	Fire, street sbrinkling, public institutions, except schools.	No	No.
Abilene, Kan	Sand springs	None	1,500,000 gals; street sprinkling, schools, library, city hall.		$30.50.
Ft. Scott	Marmaton river	Sedimentation, precipitation by coagulant.	None	Flat rate of $4,000 per year.	
Holton	Wells	None	4 public watering fountains	No	Yes.
Iola	Neasho river	Sedimentation, precipitation by coagulant.	Drinking fountains	No	Yes.
Osawatomie	River	Sedimentation, rapid sand filter.	Two churches, 2 schools, 2 horse troughs, 54 fire hydrants.	No	No.
Topeka	Wells	None	None	Paid for all water	Receives pay in taxes.
Winfield	River	Precipitation by coagul't, slow sand filter.	100 hydrants	City pays interest on bonds.	
LOWER MISSISSIPPI AND GULF:					
Guthrie, Okla	River	Precipitation by coagul't, rapid sand filter.	Street sprinkling, city hall, watering troughs, sewer flushing.	No	No.
McAlester	Impounding reserv'r	None	All public buildings	Yes	$50.
Shawnee	N. Canadian river	Sedimentation, precipitation by coagulant, rapid sand filter.	37,540,000 gallons; Fire hydrants, city hall, schools, churches, fountains, library, flushing	No	No.
Huntsville, Ala	Spring	None	None	No	No.
Greenville, Miss	Artesian wells	None	150 fire hydrants, 3 standpipes for st. sprinkling, 3 watering troughs, 2 fountains, 6 public schools, city hall, jail, 3 engine houses.	No	No.

MUNICIPAL PLANTS——Continued

Name of City	Source of Supply	Method of Purification	Financial: Water Furnished Free to City	Financial: Any Credit Given	Financial: Hydrant Rental
Lower Mississippi and Gulf—Cont'd.:					
Laurel, Miss.	Deep wells	None	School purposes	No	No.
Yazoo City	Artesian wells	None	City hall and fire department stables	No	Yes
Cuero, Tex	Gaudoloube river	Settling well	Street sprinkling		No.
Denison		Slow sand filter	8,000,000 gallons a year	No	$7,925
Ft. Worth	Artesian wells	None	Street sprinkling and washing	Water for all other purposes paid for.	$35.
Houston	Artesian wells	None	Schools, charity, fires, streets, parks, watering troughs.	No	No.
New Orleans, La.	Mississippi river	Rapid sand filter, sedimentation, precipitation by coagulant.	Fire, street sprinkling, public buildings, charitable institutions.	No	No.
Rocky Mountain:					
Provo, Utah	Springs	None	Public schools and library		No.
Salt Lake City	Mountain stream	None	All public purposes	No	No.
Greeley, Col.	Mountain stream	Sedimentation, slow sand filter.	Street sprinkling, sewer flushing, parks, churches.	None	None.
Evanston, Wyo.	Spring	Slow sand filter	All that is needed	No	No.
Pacific Coast:					
Aberdeen, Wash.	Creeks	Settling and screening	All city purposes, churches and schools	No	$30.
Port Townsend	Mountains	None	None	City pays for all water.	
Seattle	Cedar river	None	Street sprinkling and park purposes	Rest all paid for	
Baker City, Ore.	Gravity	Two settling basins	Fire hydrants, city hall, street sprinkling, flush tanks.	No	$24.
Los Angeles, Cal.	Los Angeles river	None	$158,959 for all public purposes	On Water Dept. books.	No.
Santa Cruz	Mountain stream	None	St. sprinkling, county and city bldgs., schools and churches.	No	No.
San Diego,	Mountain stream	Sedimentation, precipitation by coagulant, rapid sand filter, aerating.	50,000 gallons per month; city hall, drinking fountain, horse trough.	Depts. pay 6c. per 1,000 gallons.	$5 per year each.
Canada:					
Barrie, Ont.	Artesian wells	None	St. sprinkling, flushing sewers, drinking fountains, schools.	Parks, Town Hall all pay.	$35 anff $30.
Brantford, Ont.	Springs	Slow sand filter	None		$40.
Chatham, Ont.	Thames river	Sedimentation, precipitation by coagulant, rapid sand filter.	Fire purposes; $5,900 worth a year	No	No.
London, Ont.	Springs	None	None		$15.
Ottawa, Que.	Ottawa river	None	All water used by city	No	No.
St. Catherine's, Ont.	Lake Erie	Sedimentation	None	Yes	$20.
St. Thomas, Ont.	Wells and creek	Precipitat'n by coagulant	Free for city buildings, street fountains	No	No.
Vancouver, B. C.	Rivers	None	$40,000 for street sprinkling, fire protection, flushing sewers.	No	No.
Winnipeg, Man.	Artesian wells	None		Yes	$90.

PRIVATE PLANTS

Name of City	Source of Supply	Method of Purification	Financial: Water Furnished Free to City	Financial: Hydrant Rental
New England:				
Brewer, Me.	Penobscot river	Mechanical filters	Not any	$40 each per year.
Hingham, Mass.	Pond and well	None	None	Less than $10 ea.
Southbridge	Brook	Slow sand filter	None	$25 per year.
Bristol, R. I.	Kickemnet river	Precipitation by coagul't.	All town buildings and six drinking fountains	$3,666.67.
New Haven, Conn.	Lake and river	Slow sand filter	For all city purposes	No.
Rockville	Lake Snipsic	None	None	$20 per annum.
Middle Atlantic:				
Cortland, N. Y.	Springs	None	Municipal buildings free	$33⅓ per hy. per yr.
Rensselaer	Hudson river	Sedimentation, precipitation by coagulant, rapid sand filter.	Public buildings, flush tanks, sewer flushing, sprinkling, 15 million gals. per year.	158 hydrants, $40 per year.
Sandy Hill	Springs and brooks	Sedimentation	Up to 100,000 gals. each to fire houses, municipal bldgs,, parks and fountains.	$47 per hydrant.
Seneca Falls	Cayuga Lake	None	Hose houses, drinking fountains	$4,000 per year.
Utica	West Canada creek and springs.	Sedimentation		Pays under special contract.
Waterloo	Seneca river	None	None	
Montclair, N. J.	Passaic river		None	$26 per year.
Washington		None		$480 for all purposes.
Carbondale, Pa.	Ponds and lakes	None	None	$15.
Chester	Delaware river	Sedimentation, precipitation by coagulant, rapid sand filter.	10,000,000 gallons flushing sewers and streets	$40 each.
Clearfield	Stream and springs	None	Flushing sewers, st. sprinkling, public bldgs	$11.34 per year.
Corry	Artesian wells	None	City bldgs., fountains, 100,000 gals. per day in summer and 10,000 in winter.	$50 per year.
Easton	Delaware river	Sand strainer in bottom of river.		
Freeland	Artesian wells	None	Municipal bldgs. and cleaning fire apparatus	$15 per annum.
Johnstown	Mountain stream	None	None	$25 per annum.
Lewisburg	Mountain stream	None	Engine house use	$20 per hyrdant.
Mauch Chunk	Spgs. and artes. wells	None	Fire hydrants	
Meyersdale	Mountain stream	None	Municipal buildings	$16 ea. per year.
Milton	Mountain stream	None	Engine house use	$20 per hydrant.
Montrose	Lake Jones	None	One fountain	$30 each.
Reynoldsville	Mountain springs	None		$25 per hydrant.
South Bethlehem	Lehigh river	Slow sand filter	Fire purposes and municipal building	$25 per year.
Williamsport	Mt. stream and wells	None necessary	Charities, drinking fountains	$5 with proviso.
South Atlantic:				
Easton, Md.	Artesian wells	None	One drinking fountain and 2 drinking hyd'ts	City pays $25 each
Bluefield, W. Va.	Springs	None	Fifteen fire hydrants	43 fire hydrants at $30 each per year
Charleston	Elk river	Precipitation by coagulant. Rapid sand filter	75,000,000 gals. per yr.; schools, fire dept., city bldg., street department.	$50 per year.
Point Pleasant	Ohio river	Slow sand filter	One drinking fountain	$50 each per year.
Washington, N. C.	Wells	None	5 drinking fountains, public schools and bldgs., for drinking purposes only.	$37.50 each per year.
Wilmington	Deep wells	None	Flushing drains and open sewers; fire practice 12 times a year	$45 a year.

PRIVATE PLANTS—Continued

NAME OF CITY	Source of Supply	Method of Purification	FINANCIAL	
			Water Furnished Free to City	Hydrant Rental
SO. ATLANTIC.—Con.:				
Charleston, S. C.	Goose creek	Sedimentation, precipitation by coagulant, rapid sand nlter, sterilization by chemical, removing iron by aeration.	300,000 gals. per day; fire, street cleaning, public buildings, parks, drinking fountains.	$44,000 paid for all purposes.
Greenville	Springs		Schools, public bldgs., drinking fountains, flush tanks up to 400 gals. per day per tank.	$40 first 100; $30 balance.
Orlando, Fla.	Lake	None		$45.45 per annum.
Tampa	10″ wells		None	$35 per annum.
OHIO VALLEY:				
Akron, O.	Lake and wells	None	6 per cent of total pumpage	$40 per annum.
Delaware	Wells	None	City Hall, fire department, 3 fountains	$35.
Kent	Wells	None	Public schools, 3 watering troughs	$40.
Shelby	Wells	Slow sand filter	5 mil. gals. per yr. flushing sewers and used in public buildings.	$40.
Warren	Mahoning river	Precipitation by coagulant; rapid sand filter.	Fountain, watering troughs, city buildings, schools, churches	1st 100, $45; 2d, $25 $35; all over 125, $25 each.
Xenia	Springs and wells	None		$32, 201 hydrants.
East Chicago, Ind.	Lake Michigan	None	Pub. bldgs., st. sprinkling, sewer flushing	$40.
Greensburg	Wells	None	Pub. schools, library, city bldgs., engine house, 6 churches, 8 drinking fountains, sewer flushing	$33.
Linton	Wells	None	City buildings and flushing sewers	$50.
Richmond	Infiltration galleries	None	Sewer flush tanks, schools, hose houses, parks, drinking fountains, watering trough.	$55 on 225; $49 on balance.
Rockport	Deep wells	None		$40 for 1st 10; $30 each for balance.
Terre Haute	Wabash river	Sedimentation, precipitation by coagulant, rapid sand filter.		$40.
Vincennes	Wabash river	Precipitation by coagulant, slow sand filter.	All hose houses, parks and city buildings	$33⅓ to $40.
Winchester	3 10-in driven wells	None	4 public drinking fountains, 2 watering troughs, city hall	$50.
Alton, Ill.	Mississippi river	Precipitation by coagulant, slow sand filter, settling basin.	City hall, fire departments, 5 public watering troughs, public schools.	$50.
Belleville	Wells 100′ deep	None	1,500,000 gals. per year, City bldgs., flushing sewers	300 at $75; all over $60.
Champaign	Deep wells	Removing iron, aeration.	City hall, fire dept., city park, 10 drinking fountains	$40 per yr. each.
Danville	River	None		$40 per annum.
Lincoln	Wells	None	30,000,000 gals.; public schools, city bldgs., watering troughs, sewers.	$35 per hydrant; 171 in use.
Mattoon	Deep wells	None	Fountains, watering trough, pub. bldgs., parks	
Sterling	Deep wells	None	Fire Dept., sewer flushing, fountains, schools, and churches	$7,740 for 174 hydrants.
Hopkinsville, Ky.	Creek	Sedimentation, precipitation by coagulant, rapid sand filter, aeration.	Washing sewers, 9 water troughs, public schools, 5,000 gallons per day.	$40 ea. per yr. for 102; $30 ea. per year for 24.
Paris	River	Precipitation by coagulant, rapid sand filter.	None	$30 per year.
Knoxville, Tenn.	Tennessee river	Sedimentation, precipitation by coagulant, rapid sand filter.	Flushing sewers, churches and schools	$40.
UPPER MISSISSIPPI-MISSOURI:				
Beloit, Wis.	Wells	None	Schools and public buildings	
Green Bay	Artesian wells	None	City bldgs., schools, parks, drinking fountains	$37.50.
Ripan	Wells	None	10 million gallons; public buildings, schools, churches, street sprinkling.	$4,000 for 75; $38 for 27 additional, 5 mill tax on property in water dist.
Burlington, Ia.	Mississippi river	Precipitation by coagulant, rapid sand filter.	City offices, 2 fountains, 20 watering troughs, flushing sewers, fire hydrants.	$1,500 for 74 hys.
Clinton	Artesian wells	None	About 25% for flushing sewers, etc	$350 per mile.
Des Moines	Filter galleries	Slow sand filter	1,000,000 gals. per day; all munic. purposes	$42.50.
Ottumwa	Des Moines river	Precipitation by coagulant.	8%; public bldgs., parks, flushing sewers and streets	
North Platte, Neb.	6″ wells	None		
York	Wells	None	All public buildings and parks	$42.
Louisiana, Mo.	Mississippi river	Precipitation by coagulant, rapid sand filter.	All public buildings	Average $44.18.
Mexico	Surface and deep well.	Slow sand filter	Flushing sewers, 8 drinking fountains for animals	$50.
Moberly	Two deep wells	None	Public bldgs., fire and flushing sewers	$5,800 for first 70 after that $30.
Springfield	Springs	None	Street department and city offices	$40.
Washington	Missouri river	Precipit. by coagulant	Fire hydrants, flushing sewers, gutters and city buildings	$3,550.
UPPER MISSISSIPPI-MISSOURI				
Atchison, Kan.	Mississippi river	Sedimentation, precipitation by coagulant.	Schools, city buildings, horse fountains, flushing sewers and streets.	$40.
Lawrence	Wells	Removing iron by aerating in settling basins.	Schools, park, cemetery, flushing sewers	$33.75.
Parsons	Rivers	Sedimentation, precipitation by coagulant, slow sand filter.	200,000 gallons; flushing sewers, city buildings, schools, fountains, fire protection.	$60 for 50; $50 for 80.
LOWER MISSISSIPPI AND GULF:				
Fort Smith, Ark.	River	Precipitat'n by coagulant	50,000,000 per yr.; schools, city bldgs., flush tanks	$50.
Hot Springs	Water shed	Sedimentation, precipitation by coagulant, rapid sand filters.	None	60 hydrants at $4.46; 60 hydrants at $6.25.
Helena	Artesian wells	None	City Hall, 3 watering troughs	$35.
Pine Bluff	Deep wells	None	All city buildings	$43–$40.
Wesson, Miss.	Creek	None	Fire purposes only	No.
Corsicana, Tex.	Artesian wells	None	All public buildings	86 hyd'nts, $50 ea.
El Paso	Deep driven wells	None	18 million gals.; parks and public buildings	$52.50.
Weatherford	Deep wells	None	All schools and public fountain	$75 per year for fire protection.
Douglas, Ariz.	Wells	None	None	$50.
Albuquerque, N.Mex.	Wells	None	2,000,000 gallons per day	$50 for 1st 100; $35 for all over.
Raton	Sagarite creek	None	Parks, fountains, schools, churches, city hall, street sprinkling	$50.
ROCKY MOUNTAIN:				
Park City, Utah	Tunnel in mountain	Sedimentation	2 troughs, 3 drinking fountains, city hall, street sprinkling.	$24.
PACIFIC COAST:				
Olympia, Wash.	Springs and artesian wells.	None	Parks, street washing, fire barn	$50 1st 20; $36 for all over.
Fresno, Cal.	Deep wells	None	Street sprinkling and parks	
Salinas	Wells, 200′ deep	None	Fires only	No.

METERS AND HYDRANTS

MUNICIPAL PLANTS

Name of City	Meters					Hydrants	
	Per Ct. of Services Met'd	Other Method of Reducing Waste	Where Set	Average Cost of Setting	Average Life	Used by Other Department?	Objectionable?
New England:							
Dover, N. H.	52		In cellar	½", $1.50; 2", $2.50	21 yrs., still good.	No.	
Keene		House to h'se insp'n.				No.	
Lancaster	None					Street and Swr. Depts.	
Manchester	70	None.	Inside of cellar near wall.	$4.00	18 years.	Street Department.	Yes.
Somersworth	30		Cellar	.50	15 years.	Street Department.	Yes.
Montpelier, Vt.		Inspecting fixtures.				Street Department.	Yes.
Rutland	None					Not unless Water Dpt. notified.	
Arlington, Mass.	50	Inspection	In cellar	$12.80, inc. meter.		Street Department.	Yes.
Boston	5.6	House to h'se insp'n.	Inside of premises; if outside, in concrete box.	¾" & 1", $1.75; 1", $2.00; 3" & 4", $5	Using those set in 1882.	Yes.	Yes
Brockton	99.64	None.	In cellar and at curb in 18" drain pipe.		Used 25 yrs., still good.	Yes.	Very.
Brookfield	10	Service tap on meter	Inside of house; some at curb.	$2.50.	16 years.		No.
Cambridge		Inspection	On premises, outside in concrete box.	¾" to 1", $3.00.		Yes.	Yes.
Chicopee	24	Careful inspection.	In cellar			Street Department.	Yes.
Clinton	88	Refusal to abate l'ge meter bills when water is wasted.	In cellar, inside of shut-off.	¾" to 1", 80c.; larger size, $2.00.	Used 20 yrs., still good.	Occasionally.	Yes.
Concord	2	Inspection	In cellar			Yes.	Yes.
Danvers		Inspection	Curb			No.	
Fall River	98.18	Inspection	In building	Set by consumer.	20 to 25 years.	No.	
Gardner	7		Inside building			Not without a permit.	
Holyoke	12	Inspection	Inside of buildings		Used 20 years.	At a charge of $1.50 for opening hydrants.	
Leominster	55	Insp'n, aquaphone.	In cellars; some at curb.			Sewer Department.	Yes.
Lowell	75	None.	In cellars generally; some at c'b in concrete box.	In cel., $2; conc'te boxes, $5; brick basin, $100.	30 years.	Forbidden by law but not enforced.	Yes, very.
Lynn	40	Close inspection.	In cellar at point of entry.	$1.25.		No.	
Maynard	88	Inspection	Cellar		Used 18 years, still good.	Only under Water Dpt. supervision.	
Middleboro	50	Vigilance	In cellar			No.	
Monson	90	Close supervision.	In cellar	No cost to consumer.	Used 15 years, still good.	No.	
New Bedford	32	House to h'se insp'n.	Just inside house; few at curb.		20 years.	Yes.	Yes.
Newburyport	2	Frequent inspection.	In cellar			Only under Water Department's direction.	
Newton	87.6	None.	Inside cellar	¾", $1.50; 1", $2.50.	20 years.	Yes.	Yes.
North Attleboro	100	None.	Cellar or in building	Consumer pays.	10 years.	Street Department.	No.
Peabody		Inspection	Inside of house or shop			No.	No.
Provincetown	30	Inspection	Basement			No.	
Spencer	90	None.	In cellars	¾", $1.60; 2", $7.00		Sewer Department.	No.
Springfield	54.82	General inspection.	In cellars mostly; some in vaults outside.			Street and Sewer Departments.	Yes, very.
Somerville	40	House to h'se insp'n.	Mostly inside			Sometimes.	Yes.
Swampscott	90		Some at curb and some in cellar.	$2.50.	5 to 15 years.	No.	
Taunton	48	None.	In cellar, few in brick wells.		15 or 20 years.	No.	
Waltham	10	Inspection	In cellar	$1.00 to $2.00.	15 to 20 years.	St. and Swr. Dept.	Yes.
Watertown	100	None.	Set in cellar	$1.00.		No.	
Winchester		House to h'se insp'n.	Cellars, few in plank boxes.	In cellar, $1.00; 2" in box, $10.00.	Used 20 yrs., good yet.	Yes.	Yes.
Winthrop	20	House to h'se insp'n.	In cellars	¾" and 1", $2.98.		Sewer Department.	Very m'ch so.
Worcester	98		In cellars	$9.00.	20 to 25 years.	Under special permis'n	
Hartford, Conn.	100	Constant inspection.	Inside premises			After meters are at'h'd.	Yes.
New Britain	25	Inspection	In buildings	$8.00.	10 years.	Yes.	Yes.
New London	16	None.	Various places		10 to 15 years.	Street Department.	Yes.
Norwalk	1	Inspection				Street Department.	No.
Norwich	10	Inspection		¾" to 1", $3.00.	10 years.	Street Department.	Yes.
South Norwalk		Inspection	Inside buildings			Street Department.	Yes.*
Wallingford	6½	Inspection	In buildings generally	¾", $9.33		No.	Yes.
Waterbury	19	Inspection	In cellars			No.	Yes.
Winsted		Inspection				No.	No.
Middle Atlantic:							
Albany, N. Y.	19	House to h'se insp'n.	Inside house if possible.	At curb, ¾", $12.00		Yes.	Yes.
Binghamton	20	Inspection	Inside cellars.	$2 for small, $5 for large.	12 to 15 years.	Street Department.	Yes.
Buffalo	2	Inspection	Inside where possible		10 to 20 years.	Street Department.	Yes.
Cohoes		Inspection	Inside of building			Yes.	Yes.
Dunkirk		Not any.	Inside	Cons'm'r sets meter and l'ses same from Water Com.		Yes.	Yes.
Gloversville	9	Inspection	Cellars; curb in Clark box			No.	
Homer Village		Inspection	Inside	¾", $8.40		No.	Yes.
Hoosick Falls			With Grand Rapids meter box.	Very small.		Street Department.	Yes.
Hudson			Inside	¾", $8.60; 4", $160.		Street Department.	Yes.
Jamestown	24	Inspection	In cellar or Clark meterbox.	$8.00.	15 to 17 years.	Street Department.	Yes.
Johnstown	10	None.	In cellars	$1.00.		No.	Yes.
Little Falls	12	Inspection		¾", $2 40.		Street Department.	No.
Malone	None	None.				No.	
Mechanicsville	100		In cellars			Street Department.	
Middletown	8	Inspection	Inside of building			Yes.	Yes.
Newburgh		Inspection				By consent of Water Comm.	No.
No. Tonawanda			In premises			Street Department.	No.
Olean	3	None.	In cellars	Expense of owner.	25 years.	No.	
Plattsburgh	10	Inspection	In cellars			No.	
Rochester	85	Inspection	In cellars	Less than $1.00.	20 years.	Only under supervis'n of Wtr. Dpt. empl'ees.	Yes.
Saratoga Springs	90	Not any.	In cellars	$0.50.	6 years.	Sewer and St. Depart't	No.
Walden	100	None.	In cellars	¾", $8.95		No.	
Whitehall	25	Inspection	Inside cellar wall	¾" to 1", $1.50.	Lifetime.	Street Department.	Sometime.
Yonkers	100	None.	In houses		Used 30 years, still good.	Street Department.	No.
Asbury Park, N. J.	100	None.	In cellars generally, or at curb in Hersey meter box.		Over 20 years, still good.	Street Department.	Yes.
Atlantic City	80	None.	Preferably at curb, also in yard or basement. 20" terra cotta pipe with cast iron cover.	$2 per meter; meter box and cover, $7.00.	10 years.	St. sp'kling and contractors under supervis'n of W.D.empl'ees	Not if reasonable precaution is taken.
Bordentown		Inspection	In cellars			No.	
Burlington	None					No.	

* Hydrants require more inspection and replacing.

MUNICIPAL PLANTS—Continued

NAME OF CITY	METERS					HYDRANTS	
	Per Ct. of Services Met'd	Other Method of Reducing Waste	Where Set	Average Cost of Setting	Average Life	Used by Other Department?	Objectionable?
MIDDLE ATLANTIC—Continued:							
Camden, N. J.	7	House to h'se insp'n.	Inside when possible; also at c'rb in terra cotta box with iron frame and lid.	$1.00 to $6.00	8 to 15 years	Street Department	No.
East Orange	9½	House to h'se insp'n.	Basement and at curb in Clark meter boxes.	$1.50 for ⅝", $2.00 for 1". Curb set'gs cost $10 comp'te.		No, except on special permit.	No.
New Brunswick	25	Inspecting houses	In houses	$1.50 each	25 years	Street Department	Yes. W'rs out hyd't valve.
Allentown, Pa.	.0035	Inspection	On premises and inside curb			Street Department	
Bradford			Inside building	$10.00		Street Department	Yes.
Franklin	2	Inspection	Cellars			Street Department	
Meadville	45	None	Cellars			No	Yes.
Oil City	65	Inspection	In cellars mostly; if outside in wooden boxes.			Street Department	No.
Reading	10.1	General inspection	In cellars or inside of buildings		8 years	Yes	No.
Titusville	5	None	In buildings			Street Department	No.
Wilmington, Del.	27.6	None	Cellars of private dwellings, sidewalks of manufacturers.	⅝", $12; ¾", $16 including meter.	20 years	Park and St. Dept. for sprinkling.	Very much so.
SOUTH ATLANTIC:							
Washington, D. C.	20	Inspection	⅝" at curb in vit. tile box with iron cover; larger meter inside.	⅝", labor, $2.50; material, $13.50.		Yes	Yes.
Baltimore, Md.	4		Generally in sidewalk, in brick vault, fitted with iron frame and cover. In exceptional cases in premises.	Setting only ⅝", $9; 4", $30; 6", $40.		Yes, all city Depts.	Not especially so.
Cumberland	None	None				Street Department	At times.
Charlottesville, Va.	10	Inspection	At curb in iron box	80c. for labor		Very seldom	Very.
Manchester	4	Cut off when found running.	At curb in cast iron box	$8.00		No	No.
Pulaski	None					No	
Richmond	56	Automatic closets	At curb, special box so meter can be taken out without digging up	$2.25	12 years	Yes	No.
Fairmont, W. Va.	None					Street Department	No.
Piedmont			Inside house	$4.00		Street Department	When water is scarce.
Edenton, N. C.	5		On property of consumer	½", $1; ¾", $1.50		Yes	No.
Salisbury	75	None	In cast iron box	⅝" and ¾", $2.50; $3.25 for 1" and over.	15 to 20 years	Yes	Yes.
Winston	60		At curb in cast-iron box	$2.50		Street Department	Yes.
Greenwood, S.C.	80		Inside property line, 8" terra cotta box.	$1.50		No	
Orangeburg	50	None	Curb, cast-iron and brick box	¾", $3.50	3 to 20 years	Yes	Yes.
Americus, Ga.	28½	House inspection	At curb, cast-iron box 12" and 18".	Box, $3; setting, $5.		Street and Swr. Dept.	No.
Atlanta	100		Curb in iron box			All departments	Yes.
Elberton	25	None	Curb, in cast-iron box	$3.25 with box		For sprinkling	Yes.
Newman	100		At curb, Hersey meter box	¾" for $1.15		Yes	No.
Rome	20	None	Curb principally, in cast-iron box	$3.00		No	
Valdosta	90	Inspection	At curb, in iron box	⅝", $2 with box		Street Dept. in outlying districts.	
Jacksonville, Fla.	70		Concrete box, iron cover	To 1", $4.50 with box.	15 years	Street Department	Yes.
OHIO VALLEY:							
Ashland, O.	80		Mostly in cellars	$9, meter included	Over 12 years	No	No.
Bellevue	None					No	
Canal Dover	1	None	In cellars	$1.00	10 to 12 years	No	Yes.
Canton	3	Inspection	In manhole, bricked, with cast tops.			Street and Swr. Dept.	Yes.
Celina						Street Department	
Cleveland	93.6	Aquaphone	In basement and in brick vault at curb.	⅝", $3.40; brick v'lt, $12.40; 3", $17.80; brick v'lt, $27.60.			
Columbus	93	Inspection, and meter readers' insp'n.	Cellars mostly			Street Department	Yes.
Coshocton	2	Inspection		$1.00	8 years	Only under supervision of Water Dept.	Yes.
Dayton	91.67	Daily inspection	Cellars and yard pits	$1.00, all sizes	9 or 10 years	Street Department	No.
East Cleveland	100	None	Mostly in houses, but in pits where connection is over 70 ft. from building.	⅝", $10.50; 1", $20, including meter.	50 years	Yes	No, if carefu .
Eaton	60	Inspection	Part at curb and part in cellar	$8.45	10 to 12 years	No	Yes.
Findlay	100	Inspection	At curb in cast-iron boxes, and in basements.	⅝", $4; larger sizes set in pits, $8.	10 years	Street Department	Yes.
Gallipolis	75	None	In cellars	$2.00	8 years	No	Yes.
Hicksville	None					No	
Mansfield	25		In basement of buildings	⅝ to 1", $2.00	12 years	No	
Marietta	10	Inspection	At curb and in basement	$1.00		Street Department	No.
Niles	8	None	In cellars			Yes	Yes.
Norwalk	½		In cellars or at curb in box of sewer pipe.	In cellars, .50 to $1; in box, $3 to $5.		Street Department	No.
Oxford	5	Enforc'm't of rules.	In buildings	$2.00	10 years	No	
Painesville	100	None	House and curb meter box, own design with Clark cover.	⅝", $6		Yes, all Departments	Yes.
Reading	70		Cellar if possible, box or tile if outside.	⅝", 50 cents. $7.50		Yes	Yes.
Springfield	9	Careful inspection	In basements	$7.50		Street Department	Yes.
Toledo	80	Inspection	Cellars and basements		15 years	Street Department	No.
Toronto	5	None	Cellars and inside buildings	75 cents	8 to 9 years	No	
Versailles	None	Inspection				No	
Brazil, Ind.	75	None	In basements and tree row	$3, including box, for ¾" size.		Yes	No.
Brookville			Fletcher box used inside of buildings.			Street Department	
Crown Point	5	None	In patent iron box			Street Department	No.
Evansville		Special inspector	In basement or in brick well in sidewalk or yard.			Street Department	Yes.
Fort Wayne	30		At curb and in cellars	⅝", with meter, $10		Street Department	No.
Garrett	None	Inspection				Yes	No.
Hammond	12½	None	Curb and basements	$9.00		Yes	Yes.
Huntington	80	Strict rules	Curb and cellar	¾", $11	12 years	Street Department	No.
Marion	7		At curb and in cellars	⅝" and ¾", in cellar 75 cts.; at curb, $2.50.		Street Department	Yes.
Mishawaka	5	None	In basement, and at curb with tile and cast iron cover.	$5.00		Street Department	Yes.

MUNICIPAL PLANTS—Continued

Name of City	Meters: Per Ct. of Services Met'd	Meters: Other Method of Reducing Waste	Meters: Where Set	Meters: Average Cost of Setting	Meters: Average Life	Hydrants: Used by Other Department?	Hydrants: Objectionable?
OHIO VALLEY—Con.:							
Plymouth Ind.	25	Fine for wast'g wat'r	Ford boxes at curb; others in cellars.	⅝" meter at curb, $14, with meter.		Street Department.	Yes.
South Bend	15	Inspection	At curb and in basements.	Brick box at curb, $3; in basm't, $2.	15 years	Street Department.	
Aurora, Ill.	100	Care of leaks	In cellars and basements			Street and Swr. Dept.	Yes.
Bloomington	95	None			12 years		Yes.
Canton	100		In basements and cellars, 5% in Clark and other boxes.		10 years	Street Department.	Yes.
Charleston	None	Inspection				Yes	No
De Kalb	12	Inspection	In basements mostly; also in sewer pipe boxes.	⅝", $1.25 to $3		Street Department.	Yes
Elgin	50	Inspection	Inside of bldg., very few outside.	$3.25	Used 20 yrs., still good.	Sewer Department.	Yes.
Rock Island	15	None	Mostly inside bldgs., few at curb line.	$2 up	12 years	With permission of superintendent.	
Sycamore	100		In cellar of property	25 cents	15 years	Street Department.	No.
Covington, Ky.	100	None	At curb, few in cellar. Buffalo and Clark meter boxes used.	⅝", $15, complete.	More than 15 yrs.	Street Department.	Yes.
Danville	100	None	At curb in 20" vitrified tile, cast-iron top.	Meter top and box furn. free by city; setting paid by consumer.	13 years	Street Department.	No.
Newport	27	General inspection	Mainly in cellars	⅝", $14; ¾", $22	15 years	No.	
Bristol, Tenn.			Inside buildings.			No.	
Clarksville	None	Supervision of plant.				Street Department.	No.
Jackson		Inspection	At curb if convenient, otherwise on property.		4 years	Yes	No.
Memphis	34	Vigilant inspection	Just inside of curb; sometimes on property.	Avge., $5.; box, $3.55.	20 years	Board of Health and Street Cleaning.	Yes, very.
UPPER MISSISSIPPI-MISSOURI:							
Mitchell, S. D.	100	None.	Must be in basement.	¾", $1.00		Yes	Yes.
Battle Creek, Mich.	90	Charge for leaks not repaired.	Mostly in brick pits in cellars, some in large brick pits outside.	$4.00 to $5.00	20 years	Yes, some	Yes.
Detroit	9	House to h'se insp'n.	Generally in cellars; if outside, in metal boxes.			Under supervision of Fire Department.	Not under supervision.
Greenville	1	Inspection	In building			No.	Yes.
Holland	100		Some in cellar and some at curb in brick or cement box.	Consumer pays cost.		With consent of Bd. of Public Works.	Yes.
Houghton	100	Test every 30 days.	Brick manholes.	¾", $1; 2", $3	20 years	Yes	Yes.
Ishpeming	75	None.	A few at curb in tile, others in basement.	$12.50.		Street sprinkling	N't with proper device on hydrant.
Lansing	33⅓	Inspection	One-third at curb, rest in cellar.	75 cts. to $5	12 to 15 years	Street Department.	Yes.
Ludington	50	None.	Basement when possible; at curb, 16" vit. box with ir'n c'v'r	¾", $3.		Yes	No.
Manistee	9	Education		$14	10 to 12 years	Street Department.	Yes.
Marquette	1.3	None.	Basements generally.	$1.50		Yes	Yes.
Muskegon	33	Inspection	In basement and at curb in cement box.	$16	25 years	Street Department.	Yes.
Port Huron			At curb and in basements.	$13		Yes	No.
Ypsilanti	35	None.	In cellars mostly	75 cents	10 years	No.	No.
Cloquet	100	None.	Inside building			No.	
Duluth	45		Almost entirely in premises. If at curb, in tile boxes.	¾", $1.42; 2", $5.50; 4", $8.	11 years	Water works employee operates hydrant at expense of consumer.	Yes.
Fairfault	85	None.	Mostly in basements. If at curb in concrete manhole.			No.	
Mankato	90	None.	Principally in cellars.			No.	
Minneapolis	77	Inspection	In cellars, some in brick cisterns.	From 5 to 12	7 years	Swr. and Eng. Dept.	Yes.
Moorhead	95		Mostly in basement, few in brick manholes.	In bas'm't, $3; in manhole, $10.		No.	
New Ulm	100		In basements.			No.	
Owatonna	10	Inspection	Mostly in basements.			Sewer Dept. under direction of Wtr. Dept.	
Baraboo, Wis.	20	None.	In basements.	$1.50 to $5	15 years	No.	
De Pere		None.	Basements and curbs.	$1.48.		No.	Yes.
Eau Claire	20	Inspection	In building			Street Department.	
Ft. Atkinson	85	None.	In cellars.	¾", $15, inc. tap and service.		Yes	Yes, if manager is not informed.
Madison	99	None.	In cellar. Use galvanized iron box.			Yes	Unless used through st. sp'k'g valve.
Rice Lake	65		In buildings.			Street Department.	No.
Waukesha	100	None.	In buildings.	¾" meter, $8, including taping & service pipe.		Street Department.	Not if w'tch'd
Cedar Falls, Ia.	55	None.	In cellars.	$1.00		Street Department.	Decidedly so.
Cedar Rapids	50		All in cellars.	$1	20 years	All City Depts.	No.
Cherokee	100		In basements.			Sewer Dept.	Yes, in cold weather.
Eldora	30	Inspection	In basement where possible; curb meters in tile boxes.	Inside, $1; outside, $2.		St. and Swr. Dept.	Yes, particularly street sprinkling.
Fairfield	50	Cutt'g consumer off.	All in cellars	¾", with meter, $10	20 years	Yes	No.
Glenwood	100		On premises.		10 years	No.	
Mason City	100		Mostly in cellars			Not unless operated by Water Dept.	No.
Muscatine	8	Inspection	Cellars.		5 to 7 years	Sewer Department.	Yes, very.
Oelwein	99		Basements, cellars and pits.	$1.50.	10 years	Yes	
Osceola	100		In building.	$12.50 to $15.50.		Only occasionally	Yes.
Sioux City	100		Inside, mostly.		20 years	Street and Swr. Depts.	No.
Beatrice, Neb.		None.				No.	
Grand Island	100	Inspection	Cellars and at curb in brick box.			Street Department.	No.
Hastings	100	Inspection, charge for waste.	Cellars and at curb in brick pits.			Street Dept., pays $22 per month.	No.
Lincoln	100	None.	Inside building.			No.	Yes.
Fulton, Mo.	50	Inspection	Mostly in basement, some outside in tile, some with ext'n dial.		5 to 12 years	Street Department.	No.
St. Louis	6	Inspection	At curb and in cellar.		15 years	No; sep. hydrants for street sprinkling.	
Abiline, Kan.	15	Inspection	In basement and at curb in concrete box.	$5		No; special hydrants for street sprinkling.	No.
Ft. Scott	60	Inspection	Just inside property line.	¾", $11; 1", $17.50	20 years	Street Department.	No.
Holton	100		In cellars and basements where possible.			Yes	No.
Iola	1	Inspection	No established rule			Yes	Yes.
Osawatomie	16	None.	In 15" sewer pipe with cement lid and bottom.	$14		Street Department.	No.

MUNICIPAL PLANTS—Continued

Name of City	Meters: Per cent of Services Metered	Meters: Other Method of Reducing Waste	Meters: Where Set	Meters: Average Cost of Setting	Meters: Average Life	Hydrants: Used by Other Departments?	Hydrants: Objectionable?
Upper Mississippi-Missouri—Con.:							
Topeka, Kan.	65	Inspection and self-closing fixtures.	Principally in cellars; tile boxes used.	$1.50 in cellars; $3 in boxes.		Street Department.	Yes.
Winfield	60	Inspection	Prefer setting at curb in concrete box.			No.	
Lower Miss.—Gulf							
Guthrie, Okla.	25		At curb in cypress box with iron plate.			No.	
McAlester	100		At curb, in concrete and iron box			Yes	Yes.
Shawnee	99	None	At curb in concrete meter box	$3.50 box & labor		Street Department	Yes.
Huntsville, Ala.		None	At curb, in 15″ sewer pipe with cast top.	¾″, $9	Used 10 years, still in use.	Street Department	No.
Greenville, Miss.						No.	
Laurel	None	City ordinances				No.	
Yazoo City	12	Insp'n and discontinuing service until leak repaired.	At curb in box of tile on brick, iron covers.	$22		Street Department	No.
Cuero, Tex.	None					Street Department	No.
Denison	93	None	At curb and in alley in cement box, self-locking iron lid.	$1.35 for box, 50c. for labor. ¾″ to 1″	10 to 15 years.... few 22 years.	Yes	Yes.
Ft. Worth	100		Set at curb in cast-iron box, 2′x1′x4′.	Box, brick work and labor, $3.80.		Yes	Yes.
Houston	10	Inspection	At curb in concrete box	$6	10 years	Street Department	Yes.
New Orleans, La.	None					Street Department	
Rocky Mountain:							
Provo, Utah	2.5	Rebanding of pipe		$10.25		Street Department	
Salt Lake City		Vigilance	Inside premises or in wooden boxes at curb.		8 years	St. Dept. and City Contractors.	Very.
Greeley, Colo.	Factories	None				Yes	
Evanston, Wyo.	33⅓			$10		Yes	Yes.
Pacific Coast:							
Aberdeen, Wash.	12½	Inspection	Curb in wood box, cast iron frame and cover.	⅝″ to ¾″, $5; 3″ to 4″, $12.		Yes	Yes.
Port Townsend	3	None	Any place we can set to adv't'ge.			No.	No.
Seattle	36	Inspection	At curb in wooden box generally, cement box in business district.	$5	10 years	Only by permission of fire chief.	Yes. Cont'rs impair hyd's
Baker City, Ore.	100	None	At curb, in wooden box	⅝″, $10, inc. meter.	8 to 14 years	Street Department	To some ext't.
Los Angeles, Cal.	55	Inspection	At curb in wooden box creosoted, cast-iron cover.	¾″, $3.40; 4″, $26.37		Yes	Yes.
Santa Cruz	5	Inspection		Up to 1″, $2	Still working, after 18 years.	Sewer Department	No.
San Diego	90	None	At curb, wood on dirt sidewalk, iron cover on cement sidewalk.			Street Department	No.
Canada:							
Barrie, Ont	33	Close supervision	In building, generally in basem't		10 years	No.	Yes.
Brantford, Can.	4	Inspection	In basements largely, or outside in brick pit.		8 to 10 years	No.	Yes.
Chatham, Ont.	47	Inspection	In cellars or lawns where conv't.			St. and Swr. Depts.	No.
London, Ont.	3.14	Inspection	In cellars and in wooden boxes	⅝″, in cellar, 50c.		Street Watering Dept.	No.
Ottawa Que.	.02	Inspection	In cellar of building			Street Department	No.
St. Catharines, Ont.	3	Inspection	Inside building, or in concrete or wood box.		15 years	No.	Decidedly.
St. Thomas, Ont.	15	None	Mostly inside, sometimes in cedar box.		8 to 10 years	Street Sprin kling	Not with comp't men
Vancouver, B. C.	8	Inspection	In sidewalk in wood box, iron cover.	$3 to $5	10 years	Street Department	No.
Winnipeg, Man.	73.7	Inspection	In houses	½″ $1.59; 1″, $2.09; 1½″, $2.70.	Used 10 years, still good.	Yes, under close supervision.	No.

PRIVATE PLANTS

Name of City	Meters: Per cent of services Metered	Meters: Other Method of reducing Waste	Meters: Where Set	Meters: Average Cost of Setting	Meters: Average Life	Hydrants: Used by Other Departments?	Hydrants: Objectionable?
New England:							
Brewer, Me		Inspection				No.	No.
Hingham, Mass.						With permission of Chief of Fire Dept.	
Southbridge	1					No.	
Bristol, R. I.	2½	Inspection	Cellars			No.	
New Haven, Conn.		Inspection	Usually in cellar	⅝″, $2.50	10 years	Yes	Slightly so.
Rockville			On premises		Used 15 years; still running	To some extent.	Decidedly so.
Middle Atlantic:							
Cortland, N. Y.	50	Close insp't'n	In cellar	$15 including meter		St. and Sewer Depts.	Yes.
Rensselaer	10	None	In cellar			St. and Sewer Depts.	Yes.
Sandy Hill		See page 972.				Street Department.	
Seneca Falls	None	Inspection				No.	
Utica	100	Inspection	Inside cellars; concrete boxes at mills			St. and Sewer Depts.	Yes;
Waterloo	1	Inspection	Inside			Yes	
Montclair, N. J.	100	None	When at curb, in iron box		After 15 yrs. only scraped ½ dozen.	No.	Yes.
Washington		None	Inside building			No.	Yes.
Carbondale, Pa.		Inspection	In cellar		10 years	Street Department	Yes.
Chester	20	Vigilance	In cellar or on curb, iron box used	½ to 1½″, $8 not including meter.	12 to 15 years	No.	
Clearfield	2½	Education	In bldgs. and at curb in brick box.			Yes.	To some extent.
Corry	40	Inspection	In cellar or at curb in brick or tile	75c. to $15	10 yrs. if worked hard. Some 15 yrs.	Sewer Department.	Not at $5 per hour.
Easton	6	Inspection	In cellars			Street Department.	No.
Freeland	12		Cellar and house	$20		No.	Yes.
Johnstown	2	Inspection	Cellars	⅝″, $12.82 1″, $22.91		By special permiss'n	
Lewisburg		Inspection	Inside and outside in brick and cement box.			No.	
Mauch Chunk		Close superv'n	In cellars	$3.50		Yes, subject to supervision.	No.
Meyerdsale	2	Attention to waste.	Inside building	Not over $1		No.	

PRIVATE PLANTS—Continued

Name of City	Meters					Hydrants	
	Per cent of Services Metered	Other Method of Reducing Waste	Where Set	Average Cost of Setting	Average Life	Used by Other Departments?	Objectionable?
Middle Atlantic-Con:							
Milton, Pa.	.....	Inspection...	Inside and outside in brick and cement box. ...	.....	.....	No.	
Montrose	None	.....	.....	.....	.....	No.	
Reynoldsville	5	None.....	Inside buildings	½", $13; ¾", $15	.....	Street Department..	No, not so far.
South Bethlehem	None	.....	.....	.....	.....	No.	
Williamsport	1	Inspection...	.....	.....	.....	Street Department..	No.
South Atlantic:							
Easton, Md.	None	Careful examination	.....	.....	.....	Street Department..	No.
Bluefield, W. Va.	53	Inspection...	At curb; 18" ring sewer pipe, 2" sections cast iron cover.	Labor, $1.75; box, 88c. Cover, $1.65; tot. $4.28	.....	Street Department..	No.
Charleston	1½	.....	.....	.....	.....	Street Department..	Decidedly so.
Piedmont	.....	.....	Inside house	$4	.....	Street Department..	Only when water is scarce.
Point Pleasant, Va.	75	.....	Mostly at curb in iron boxes	$1	10 to 15 years	Only by permission of company.	No.
Washington, N. C.	15	Inspection...	On curb, box made by Pitts. Met. Co.	$5	.....	No.	
Wilmington	90	None.....	In cellars and at curb. Use Grand Rapids meter boxes.	$4 to $5 for ¾" meter set, including box.	.....	Flushing drains.	Yes.
Charleston, S. C.	.0431	Inspection...	Some at curb, in terra cotta iron top boxes.	.....	.....	Street Department.	Decidedly.
Greenville	85	.....	Curb line, in iron box large enough to accommodate meter and cut-off.	.....	Requires replacing parts after 5 yrs.	No.	
Orlando, Fla.	None	Inspection...	.....	.....	.....	Street Department..	No.
Tampa	17½	Inspection...	Near the curb in c. i. box with lid.	In box, $3; in cement sidewalk, $7.	10 years	No.	
Ohio Valley:							
Akron, O.	30	Inspection...	In house and at curb in concrete pit and iron top.	¾" and less, $8; 6", $75.	10 years	Street Department..	Yes.
Delaware	60	Watch'g leaks	.....	$11 to $13	5 to 8 years...	Street Department..	Yes.
Kent	30	None.....	Inside cellar wall, few outside inboxes	¾", $3.50	.....	No.	
Shelby	25	None.....	Inside.	.....	10 years	Yes.	No.
Warren	38	Inspection...	Generally in cellar	$1.75	.....	St. and Sewer Dept..	Yes.
Xenia	3	Inspection...	Inside of cellar	.....	.....	Street Department..	Yes.
East Chicago, Ind.	.....	Inspection...	.....	.....	.....	No.	.....
Greensburg	5	Inspection...	Cellar	.....	.....	All City Depts.	Very.
Linton	10	.....	.....	.....	.....	Street Department..	Yes.
Richmond	50	Inspection...	Mostly in cellar	.....	7 years	Street Dpeartment..	Yes.
Rockport	.....	.....	At curb	$3.50	.....	No.	Yes.
Terre Haute	33	None.....	At curb in brick pit, 3'x2' 8", iron frame and cover.	$7	20 to 25 years	No.	Yes.
Vincennes	5	.....	Inside building	.....	.....	Sewer Department..	
Winchester	15	None.....	Some in cellars, others in boxes at curb.	$1.50 in cellar; $6 at curb in box.	.....	St. Dept., if Water Dept. is notified.	No.
Alton, Ill.	40	.....	In cellar	¾ or ¾", $1.50; 1", $2.50	.....	Street Department..	Yes.
Belleville	90	.....	"Bemis" box, plain ring tile, 15"x30"	¾", $3.50	15 years	St. Dept. and contractors.	No.
Champaign	80	Inspection...	Mostly in cellars, some in Clark meter boxes. ...	¾", $12 with meter	.....	Street Department..	Yes.
Danville	25	Inspection...	Basement and at curb	$7.50 at curb	.....	No.	Yes.
Lincoln	28	Inspection...	At curb in concrete box, home-made with "Clark" cast iron cover.	.....	.....	Street Commissioner	No.
Mattoon	33⅓	Inspection and tests.	At curb in Clark meter box	.....	.....	No.	
Sterling	75	Inspection...	In basements	.....	12 years	.....	
Hopkinsville, Ky.	40	Inspection...	At curb in sewer pipe with iron cover	¾", $3.50	7 years	Street Department..	No.
Paris	.....	None.....	.....	.....	Used 15 yrs.; still good.	No.	Very.
Knoxville, Tenn.	40	Inspection...	At curb in Hersey meter box	¾", $15.50; 2", $73	.....	Street Department..	Very.
Upper Mississippi—Missouri:							
Beloit, Wis.	1	Inspection...	.....	.....	.....	No.	Yes.
Green Bay	4½	.....	.....	.....	.....	Sewer Department..	
Ripan	8½	.....	In basement	¾", $1.50	10 years	Street Department..	Yes.
Burlington, Ia.	6	Inspection...	In basements and areaways	.....	.....	No.	
Clinton	10	.....	No special rule, wood and brick boxes with cast iron lids.	¾", $10	.....	No.	
Des Moines	95	Inspection...	In cellar and in brick meter pits	.....	.....	City uses for any purpose.	Very.
Ottumwa	24	Inspection...	Within building	¾", $1.20; 2", $4	.....	Yes.	Very.
York, Neb.	80	None.....	In cellars	¾", $2	10 years	Yes.	Very.
Louisiana, Mo.	7	Inspection...	In bldg. or in box of 2" plank at curb	$1 to $3	.....	Street Department..	Not if pump. sta is notified.
Mexico	20	.....	.....	$10 to $30	.....	No.	
Moberly	47	.....	In cellars and at curb, later preferable. In cement box, iron cover.	.....	.....	Street Commissioner	Very.
Springfield	14	Inspection...	½ in basements; ½ at curb in double strength tile with cast iron cover.	.....	.....	Street Department..	Yes.
Washington	50	.....	In cellars	¾", $12.50; 2", $65	15 to 20 years	No.	Yes.
North Platte, Neb.	None	.....	.....	.....	.....	.....	
Atchison, Kan.	13	None.....	In brick box with cast iron top	.....	.....	Yes.	Yes.
Lawrence	60	.....	In cellar, and at curb in cement tile, our own make.	¾", $1.50 in cellar; $3.50 in tile	.....	No.	
Parsons	60	.....	Inside property line or in basements.	.....	12 to 15 years	Street Department..	Yes.
Lower Miss.—Gulf.							
Ft. Smith, Ark.	20	Inspection...	At curb in cement boxes and in basements.	$4 for ¾" and ¾"	.....	No.	Yes.
Hot Springs	95	None.....	At curb in concrete box	$2.20	.....	No.	Yes.
Helena	50	.....	As near property line as possible, in galvanized iron boxes.	$3	8 years	Street Department..	Yes.
Pine Bluff	50	Inspection...	At curb in brick box with iron top.	$15	.....	Street Department..	Yes.
Wesson, Miss.	None	.....	.....	.....	.....	No.	
Corsicana, Tex.	.....	.....	At curb in wood box	.....	.....	No.	
El Paso	95	None.....	At curb in Anderson's patented box.	1" and 1½", $3	15 years	Street Department..	Yes, will discontinue.
Weatherford	50	None.....	.....	$10.50	.....	Street Department..	No.
Douglas, Ariz.	95	Inspection...	At curb in wooden box with iron cover	.....	.....	No.	
Albuquerque, N. M.	60	Inspect'n and attention.	Inside property line	$20	.....	St. Dept. may use 1 out of every 10 hyds.	Yes, Decidedly so.
Raton,	25	Inspection...	Any place, in wood box	½", $1.50; 2", $4.50	15 yrs.; good yet.	No.	
Rocky Mountain:							
Park City, Utah	None	Cut of water where waste is found.	.....	.....	.....	Street Department..	Yes, hydrants in bad condition.
Pacific Coast:							
Olympia, Wash.	.....	.....	Inside building	$8 to $12	15 years	Street Department..	Yes.
Fresno, Cal.	.....	Inspection...	.....	.....	.....	Street Department..	Yes.
Salinas	.....	.....	.....	.....	.....	St. Dept. pays 10c. per 1,000 gals.	No.

A great many of both municipal and private plants failed to answer the question as to the objectionableness of this practice. Concerning this general subject a number of expressions of opinion and additional data were received.

Holyoke, Mass., charges $1.50 for opening hydrants and insists on the presence of an inspector. In Winchester, Mass., more damage is done to hydrants by street and sewer departments than by the fire department.

Corry, Pa. (private), charges $5 per hour for use of hydrants for flushing sewers. Asbury Park, N. J., in former years had many hydrants damaged and some put out of service by ignorant men trying to close a hydrant still more after it was fully shut, and who used monkey wrenches on the operating nut. Gloversville, N. Y., hydrants are used by the Street Department for special purposes, but a water works employee is stationed at the hydrants.

J. K. Forney, chairman of commission of Abilene, Kans., writes that they tap the main with 2-inch pipes and put in 2-inch standpipes at the curb, with horizontal arms high enough to fill sprinkling wagons. A cut-off is placed underground to prevent freezing. F. F. Palmer, Superintendent of the Louisiana, Mo., Water Company, states that fire hydrants are used for gutter flushing, which practice he does not find objectionable if the pumping station is notified beforehand.

At Brantford, Canada, the municipal Water Department finds that "The use of hydrants for any purpose other than fires is highly objectionable. We will arrest any person, municipal employee or other person, who attempts to turn on or use one unless our man is in charge, except firemen for fire purposes, and after each fire the chief reports to the Water Works Superintendents every hydrant from which water has been drawn, who immediately examines it and sees that it is left in good condition."

The following letters express the opinions of a number of Water Works officials on the subject:

THE use (or rather abuse) of fire hydrants by others than those whom the hydrants were intended for is a timely topic, and one that concerns the fire insurance people the most. I might state that the use of hydrants by Tom, Dick and Harry, after a short time leaves them in a condition utterly useless for the purpose they were intended for. The great harm comes from the daily use of them for sprinkling purposes where inexperienced men are using them, since they are not particular which way they try to open or close them and strip the thread, leave them half closed with the drip partly open which causes them to leak, after which the department is telephoned to night and day that the hydrant is broken at such and such a street. The constant use for this purpose causes the drip, which is to dry the hydrant, to become clogged with mud, thus holding water in the barrel where it freezes when cold weather occurs, and is useless when needed for fire purposes. Even after the season closes and they have been tested for winter's use, some one uses the hydrant without reporting the same.

To put a stop to this abuse, this Water Department has installed seventy-five sprinkling posts to be used by those who, in the past, have gone to the hydrant to draw water, even for drinking purposes. While writing these lines notice came over the office telephone that the hydrant in a certain street is leaking.

P. J. EGAN,
Clerk, Board Water Commisioners, New Britain, Conn.

Late last fall, after the Street Sprinkling Department had shut off their standpipes, they had occasion on a Sunday to sprinkle some of the principal streets, and for that purpose, instead of turning the standpipes on, they used the fire hydrants. As a consequence, we had four hydrants to repair. Every time the fire hydrants are used for filling sprinkler carts some of them are left partly open or leaking. It is a common occurrence, wherever or whenever the Street Department uses hydrants, to leave the hydrants in condition that requires overhauling. Sometimes the hydrant stems are broken, other times they are found so badly bent that they cannot be operated.

What is true of our experience with the Street Department is also true of the Sewer Department, though probably not to the same extent, because the men who operate the hydrants for the Sewer Department, it happens, are more experienced.

The inspection of hydrants takes place here twice a year, by the firemen, who report to the Water Department all hydrants found out of order. The inspection made in the spring generally results in finding one or more hydrants with split barrels, showing that the hydrant had been left leaking during the winter and had frozen. Looking into the matter, it is found that the hydrant had been used by the Street or Sewer Department.

The point is, that the hydrants are not constructed for daily service and will not stand much hardship. They are all right for fire service, but they must be seen to after every fire in which they are used.

R. J. THOMAS, Superintendent,
Water Board, Lowell, Mass.

Regarding the use of fire hydrants by parties other than members of the Fire and Water Departments, I would say that in our city the fire plugs are used for filling the street sprinkling carts and it is from their use, for this purpose, that the greatest damage occurs. The trouble which we experience is of two kinds. First, the drivers of the sprinkling carts of course know practically nothing about the mechanism and operation of a hydrant and care a great deal less. The result is, that they frequently ruin the rods and valves and make necessary repairs which entail more or less expense. What this expense amounts to in specific cases, I am unable to state, as it is only recently that we have been keeping records of hydrant repairs in such form as to make it possible to furnish it. I may say, however, that we find it necessary to keep two men at an expense of $5.00 per day, who do nothing practically but just repair hydrants. In addition to this, it is necessary for us to have a foreman with a small gang of men almost constantly employed in making repairs where the digging up of a hydrant is imperative. The second source from which damage occurs is from the fact that hydrants are very frequently left not quite closed, but open just enough so that water can pass through the drip, and in the aggregate I am satisfied that this loss of water amounts to a good deal during the year.

I regret that I cannot give you some specific information upon this subject. It is one that has caused a good deal of solicitation and there is very little doubt but that in the near future we shall adopt some means of supplying water for street use which will take the place of and relieve our fire plugs.

ERMAN M. PECK, Engineer,
Board of Water Commissioners, Hartford, Conn.

In regard to the use of hydrants by others than the Fire Department, I cannot send you any items of expenses incurred by reason of such outside use, as we have always accepted the inevitable and repaired hydrants found needing repairs, at our own expense without question as to whom the damage was caused by, unless it was broken by a runaway team, or some accident which could not be covered up. Of course, if hydrants were only used for the legitimate purpose of extinguishing fires, it would be a very simple matter to keep track of their use, but when anybody and everybody uses them as they see fit, it becomes a more complicated matter.

In general, we find that men who are not familiar with the use of hydrants many times will not open them wide enough to keep the drip from working; also when through using them will not shut them tight enough to keep them from leaking. In either case a settlement of the ground around the hydrant is caused. They also are liable to shut them too hard and thus break some of the mechanism, which break may not appear

until the hydrant is called on for use another time. Such troubles have occurred here in my experience.

Hydrants are not built, as a rule, for continuous use, day after day, and it is the policy of all who have charge of water departments to limit the operating of them as much as possible.

At some future time a hydrant may be manufactured which shall be "fool-proof"; then the use by outside parties may not be so objectionable. But at present such a hydrant is not in existence and until it is, the fewer times the ordinary hydrant is opened and shut, the less expense water departments will have in maintaining it.

You will note that the above is merely general and I have given you no special instances. You may find in some other places particular cases, but with me the objections are based on general principles.

A. E. MARTIN,
Superintendent, Springfield, Mass.

As a general proposition, fire hydrants should only be handled by men skilled in their use and who have a knowledge of their construction. This necessarily confines their use to the Fire Department and the Water Department.

If they are allowed to be opened and closed by men unskilled in their use and construction, it has been my experience for a period of eighteen years that they are left in a leaky condition, and sometimes totally disabled from turning the wrong way when opening or closing. As an illustration as to how they can be disabled by an inexperienced person, you are referred to page 90 of the "Proceedings of the American Water Works Association for 1905." This hydrant was disabled by a man not connected with the Fire Department, who was sent to operate the hydrant during a very important fire. I have had other hydrants disabled in the same manner by the Sewer Department, which sent out green men to flush out a sewer.

Another instance: Our chief inspector, in his regular rounds flushing dead ends and other general lines, placed his wrench on a hydrant protecting a very important factory district, but although the stem turned very easily, no water would come, and upon examining the hydrant he found the stem twisted in two. It took very little power on the wrench to move it, and there is no question that the man who did the damage tried to turn the stem the wrong way. Information was had from some small boys who were playing in the street some five weeks before that the Sewer Department had sent green men out to flush the hydrant; that two men had pulled all they could and the hydrant turned easily, but they failed to get water. This hydrant was out of commission five weeks, the sewer men failing to report its condition to the Water Company.

Another case was where a hydrant was located inside the property of a cotton compress. Some one in the employ of this compress company got the habit of opening this hydrant with a Stillson wrench. When the damage was discovered the square end intended for a hydrant wrench was found to be perfectly round, so that it could not possibly have been opened with anything other than a pipe wrench. Fortunately, this was discovered and a new nut put on the hydrant; I say fortunately, because some little time later this compress company had a most disastrous fire, and this particular hydrant was the most important one they had for its protection.

I could name other instances where the Sewer Department had failed to completely close a hydrant, leaving just a little more leak than the waste would carry off, and during the first cold snap thereafter the hydrant was disabled from freezing.

I have never allowed a sprinkling cart to use a fire hydrant except in one instance, which taught me my first lesson. Several years ago, while operating a plant in the State of Missouri, a sprinkling crane sprung a bad leak in the street, and it became necessary to repair the crane immediately in order to save the paving. This break occurred during a very dusty period, and the sprinkling contractor requested that he be permitted to use the fire hydrant for one day to fill his wagon. It was necessary either to grant his request or let the merchants suffer from the dust, as the district supplied was the business district. The request was granted and the hydrant used for one day only to fill the sprinkling cart. This happened in the late fall, and some three weeks later we had our first freezeup. Two or three days after the freeze there was a hotel fire within half a block of the hydrant. The writer, living near the fire, went to it to render any assistance he could, and found this particular hydrant leaking two-thirds the way round. The firemen reported that the hydrant began leaking immediately after being turned on, and there is no doubt but that the sprinkling contractor left this hydrant leaking more than the waste would carry off and the freeze did the rest.

I could give other instances of hydrants being used by inexperienced persons, but the above should be sufficient.

A hydrant should never be used for any purpose other than that for which it is intended—that is, to protect property from fire; and should never be in charge of any other than men skilled in its use and who thoroughly realize the importance of its readiness and efficiency.

Yours very truly,

S. J. ROSAMOND,
Superintendent, Fort Smith, Ark.

The Water Works of this city is owned and operated by a large private corporation, which operates not only the water works but also an electric light plant. Fire hydrants are used by the city for fire purposes and also for filling flush tanks, which are driven about the city to flush streets, and which haul about one hundred tank loads of water per day. They of course are used only to flush the paved streets, and the hydrants that are used by them are necessarily located on the paved streets. This requires the hydrants to be opened and closed a great many times and the drivers become careless and handle the hydrants in a rough manner. Contrary to the orders that are given them, they open the hydrants only a few turns, which practice permits the drip valve at the bottom of the hydrant to remain open during the time they are filling the tanks. This not only damages the drip valves but also causes the pavement to be undermined around the hydrant. Little or no care is taken in closing the hydrant, so that we frequently find valve stems twisted off or badly bent. The tanks are filled by means of a hose attached to the hydrant nozzle and we have found a number of cases where the driver has attempted to drive the team away from the hydrant and leave the hose connected thereto, thus pulling the nipple out of the hydrant. This practice has caused us a great deal of expense in repairing fire hydrants and jeopardizes the fire interests of the city.

(From the Superintendent of a Southern Water Company.)

To detail all of my troubles with the use of hydrants for other than fire purposes would certainly take a long time. We here have cranes, with entirely separate connection from the mains, for street sprinkling. The Street Department and the contractors do use the hydrants for street work, some of them with authority, others without. One of the great troubles met with is that they are apt to use Stillson wrenches instead of a regular hydrant wrench, and in this way round off the corners of the top nuts, frequently rendering them useless, as the corners become so rounded that the hydrant wrench will not fit them. I believe that a socket nut, which could not be reached with a Stillson wrench, would be the proper thing. This has some objections, however, especially in the northern climate, where it would be apt to fill with snow and ice, and I also presume the firemen may object to it.

J. M. DIVEN,
Supt. Water Works, Charleston, S. C.

The Sewer Department and the Road Department are about the only offenders we have to complain of, and we have objected on principle to both departments using the hydrants, not because of the actual damage done, but for fear of what might happen from a defective hydrant on the "firing line" when it was most needed.

About all the damage we have had so far has been to seats and spindles, caused by inexperienced men operating the hydrants. They strain the spindles and, in case grit or sand gets into the hydrant, cut the babbit in the seat, resulting usually in a leaky hydrant.

We also find that the hydrant is not always opened full, thereby causing water to run from the drip and damage the road. Again, we find that after being used in cold weather the water is shut off and the caps are put on the outlets before the hydrant has drained, this sometimes causing the hydrant to freeze.

We are pleased to be able to state that no damage has

been caused directly through a defective hydrant, when needed at a fire. Hydrants are inspected as often as seems necessary, and immediately after having been used at a fire.

PETER J. CANNON,
Water Registrar, Clinton, Mass.

It seems to me that I cannot do better than quote from a letter I wrote last January to Mr. E. M. Peck, Engineer Water Works at Hartford, Conn. I said as follows:

"In regard to the use of fire hydrants by street sprinkling carts, will say that, in our opinion, fire hydrants should not be used for this purpose unless the hydrant is opened by an employee of the Water Works. Fire hydrants should be kept, as nearly as possible, sacred for the use in extinguishing fires. It is a great mistake to use them generally. When the writer came to Terre Haute the fire hydrants were used not only by the city employees, but by contractors who put in sidewalks. The result was that when hydrants were needed for fire purposes they were not always in shape to be used. We had one example of this kind where it was proved that the driver of one of the sprinkling wagons had been using a hydrant shortly before it was necessary to use it for a fire. Unfortunately the hydrant could not be opened and the fire gained headway rapidly while the hose was being transferred to another hydrant. We took the stand with the city officials that if we were to be responsible for the condition of the hydrants we must control them; that they were not to be used for anything but fire purposes except when one of our employees opened them. If the Sewer Department wants water for flushing a sewer, they notify this office and we send a man with a 2½-inch auxiliary valve to go on one of the nozzles of the fire hydrant. Our man opens the hydrant and the supply is controlled by the auxiliary valve. After they are through with the hydrant we are notified and send our man to close the hydrant and remove the 2½-inch auxiliary valve. The street sprinkling in this city is done by a contractor who has, at his own expense, installed 2-inch standpipes at the points where they are most needed. A 2-inch line is run from the main to the sidewalk, a brick well about three feet in diameter with an iron cover is constructed, a meter is set in the well with proper valves for shutting off the pipe and draining the same. The 2-inch pipe extends to a sufficient height to allow the sprinkling wagon to be driven underneath it, and a valve is attached to the pipe near the top so that the driver can get a supply of water without getting off the wagon."

Since the above was written we have come to an understanding with the city in regard to the use of fire hydrants for street flushing machines. The agreement contains the following:

"3. The opening and closing of said fire hydrants shall be done by a regular employee of the City Fire Department who shall have had at least one year's experience in opening and closing of hydrants.

"4. Under no circumstances shall the hydrants be opened by the teamster. Said member of the Fire Department, who is to have exclusive charge of opening and closing fire hydrants for flushing streets, shall report at the office of the Water Works Company at least once in every twenty-four hours when the water is being used for street flushing or sprinkling, give one check for each and every load of water taken from the fire hydrants, and report on the condition of the fire hydrants so that if any hydrant should be out of order it could be repaired by the Water Works Company. If the said fireman shall fail to so report the condition of said hydrants, as stipulated above, then the said Water Works Company shall not be held responsible for the condition of said fire hydrants not so reported; or if the fire hydrants become out of fix, or are disabled, and the said fireman should not report to the Water Works Company, as set out above, then said Water Works Company shall not be held responsible for said hydrants."

Yours very truly,

DOW R. GWINN,
President and Manager, Terre Haute Water Works Co.

Municipal ownership of the water plant at Memphis, Tenn., has proven a grand success, both to the municipality and to the consumers, but, as in all similar undertakings, objectionable obstacles will arise which must be surmounted.

Practical experience for five years shows that the principal obstacle we have encountered has been that of the use, or misuse, of the fire hydrants. At the present time fire hydrants are used not only by the Fire Department, but by the Board of Health, which includes about one hundred sprinkling carts, and the Street Cleaning Department, which is composed of several gangs of men, flushing the asphalt streets from the hydrants direct.

The objectionable features connected with the use of hydrants by these different departments were not noticeable at first, but at the present time they are very apparent. Sprinkling carts are driven by negroes, or by a common class of white men, whose idea of waste is very magnanimous, and who seem to care very little as to the condition of the hydrants when they are using them or when they finish. Through neglect or ignorance, they invariably leave them running, by virtue of not being turned off tightly enough, and if attention is called to this, the next opportunity they go from bad to worse, and "yank" the stem around so far as to probably break the valve.

At the present time we have probably an average of twenty-five hydrants which are continually in bad condition, caused by just such carelessness as stated above. The matter has become of so much importance that at the last meeting of the Legislative Council a committee was appointed, composed of the President of the Board of Health, Chief of the Fire Department and myself, to suggest a remedy for this fast-growing evil. After a consultation, we recommended that the Fire Department alone be allowed to use the fire hydrants (except in extreme cases, and then only with permission and under supervision of the Fire Chief), and that other connections be made around the city for the use of the Board of Health and the Street Cleaning Department. We have not yet determined as to the exact kind of fixture we will adopt; possibly, however, a connection will be made on the sidewalk, encased in an iron box, coming flush with the street.

The Water Department here, as seems to be usually the case in other cities, is, after all, the principal loser in the case, inasmuch as it is their product which is being continually wasted. This applies not only to the amount of water lost, but to the continual annoyance and complaint from consumers telephoning that 'the plug in front of my house is leaking; if I waste water my supply is shut off, while this plug is wasting more water in an hour than I would use in a month." This is ground for complaint, which has the effect of making consumers more or less careless, and is one of the principal annoyances to this already objectionable feature.

As near as can be estimated, the Water Department furnishes the city of Memphis about one billion gallons of water per year, which, at our rate, would be worth about $100,000. The city has been appropriating the sum of $25,000 per year for such service, which is only about 25 per cent of what it would have been under private ownership, or a saving to the city of $75,000. It is even more than that, for under the "old rate" this amount of water would have cost about $130,000.

The same condition may or may not exist in other cities where the plant is owned by the municipality, but I am quite sure that the city employees and the City Government in Memphis do not appreciate how much water is absolutely wasted, and how much it amounts to in the long run to the financial management of the department.

Because the Water Department belongs to the city every man connected with the government seems to think that it costs nothing, and he ought to be about as economical with it as he is with the air he breathes. I notice steps are being taken to remedy this in other cities, and I hope some day this may be remedied here; but we have to go slowly along reforms, until the people are educated up to them, since the water plant is the only thing the city owns.

The year 1908 was the most prosperous year in the history of the Water Department the city has ever known. We had an increase in gross receipts, net earnings, miles of mains laid, number of hydrants set, number of meters set and in connections; and a decrease in running expenses and in amount of water pumped. The decrease in the amount of water pumped was due to strenuous effort on the part of the inspectors stopping leaks.

I fully believe that if each water plant would take up this matter of waste and of the misuse of the fire hydrants, the people would soon see the evil as it exists, and much good would result therefrom.

Very respectfully,

WIRT J. WILLS, Chairman,
Memphis Artesian Water Dept.

ARTESIAN WATER PLANT AT MEMPHIS

Wells of an Average Depth of Five Hundred Feet—Recent Additions to the Well System—Tests of Wells and Results Obtained

By WIRT J. WILLS, Chairman, Artesian Water Department

THE water works system of Memphis, Tenn., was designed and planned by Mr. Thomas Whitman, of St. Louis, in 1887, and built by the Artesian Water Company, of Memphis. Unfortunately, Mr. Whitman never saw the successful culmination of his efforts, as he died about a month before the completion of the plant.

This plant consisted of artesian wells 8 and 10 inches in diameter, driven to an average deptht of 500 feet (where the best water-bearing sand was found). Each well emptied into a drift made of wood, 29 inches high and 33 inches wide, which were placed from 80 to 90 feet from the surface of the ground. These drifts emptied into circular brick shafts which, in turn, emptied into a main tunnel about 4½ feet high and a little wider, which emptied into a deep well from which the water was pumped into the mains.

A strainer 50 feet long was placed on the end of the well tubing, which kept back the sand, and the water rose of its own volition up to the drift, through the drift into the shaft, and thence into the tunnel and the deep well. The drifts were placed a little higher than the tunnel, so that the water would flow easily, and the shafts were placed so that both drifts and tunnel are reached through them.

The water was pumped into the mains by three ten-million-gallon Worthington pumps. As soon as a well would show a diminished supply it was overhauled, the strainer cleaned out, and if that did not have the desired effect it was telescoped by a smaller pipe; and when that ceased to be of any avail, the well was abandoned and new wells bored.

This is undoubtedly the cheapest plan for procuring artesian water, but it has its limitations. In the first place, if wells are bored too closely together the interference between them is so great that it hardly pays to continue the project. In the case here it was impossible to find clay (in which the tunnel was built) in any other portion of the city at the desired depth, consequently the plant supply found its limit at about 20,000,000 gallons per day.

As long as the city contained no more than 100,000 inhabitants this was all right, but the rapid growth which it has enjoyed for the past ten years made it necessary for some other plan to be devised. This being the largest artesian plant in the United States, there is very little for us to copy, consequently experimenting is constantly necessary.

After the city bought the plant in 1903 extensive experiments were indulged in regarding a deep-well pump, the object in view being to pump water from individual wells and into the main at one operation. After two years' experimenting the pump proved impracticable, and in the spring of 1906, during an emergency, the Commission was forced to place three second-hand air lifts over three wells in the southern part of the city, which had been bored for the above-mentioned pump, in order to supply the demand that summer. Although this was a crude plant, yet it demonstrated to the Commission that air, under the present circumstances, was the proper thing to use, and in the spring of 1907 five wells were bored in the eastern part of the city (and another very large one added later) and a new air lift plant installed, consisting of five 150-horsepower fire tube boilers; five cross-compound, two-stage Laidlaw-Dunn-Gordon compressors with a capacity of 500 cu. ft. of free air per minute each; five compound American Steam Pump Co. pumps of 1,000,000 gallons per day capacity each, and one duplex compound Worthington pump of 2,000,000 gallons per day capacity. The compressors and pumps are all run condensing.

There are six wells separated on an average of one-half mile apart. Two of these wells—Nos. 1 and 6—are situated on the city's property, and after the water is brought to the surface by air it flows down grade into the collecting basin; but in the other four wells the water is brought above the surface by air, and then forced up a grade of nine feet from ¾ to ½ mile into the same collecting basin, and from there pumped into the mains.

A complete description of the means by which this is accomplished is given as follows by Mr. C. E. Davis, our Resident Engineer:

Wells Nos. 2, 3, 4 and 5 are located in the streets 1,000, 2,000, 3,000 and 4,000 feet, respectively, from the plant, and are all connected to one general collecting main. All except well No. 5 have been placed in service. The object of locating the wells so far apart was to do away with interference. All wells are 10 inches in diameter with 50 feet of 8-inch Cook strainer, except well No. 6, which is 13 inches in diameter, with 65 feet of 12-inch strainer.

Independent 4-inch air lines are run to each well, with a 2½-inch line in all wells except No. 6, in which a 3-inch air line was used. The air lines are cross-connected in the station in such a manner that any compressor can be connected to any well.

Owing to the railroad in this section being on the highest ridge and the necessity of locating the plant along it on account of the coal question, the tops of the wells are from 7 to 18 feet below the discharge in the collecting basin.

It has long been known that moving water by air through a long pipe with a slight up-grade from the well is a highly inefficient method. Again, it was undesirable to place standpipes in the streets high enough

to cause the water to flow by gravity to the collecting basin. Accordingly, the following plan, which the writer believes is new, was resorted to:

A steel tank 6 feet high and 8 feet in diameter was sunk below the surface of the street over the top of the well, the well casing extending into the tank to within 18 inches of the top. A connection to the collecting main was run from the bottom of the tank with a check valve in same. This also extends up into the tank as high as the well tube. Over this was suspended a longer pipe, extending from a few inches above the bottom of the tank to within six inches of the top. This causes the water to follow a tortuous passage and gives an additional chance to liberate the air.

From the top of the tank a 4-inch pipe was run to a vault under the sidewalk, where it terminated in a specially designed valve so weighted as to allow the air to escape at about the pressure due to the head of the discharge in the collecting basin above the top of the well.

This arrangement has proven highly satisfactory, the water reaching the collecting basin entirely free from air. A much higher efficiency was found than when the air was forced along with the water.

Tests were made with 8-inch and 10-inch discharge pipes and the 10-inch finally used. The following table shows the best results of these tests:

Results of Air Pumping at the Central Avenue Plant

No. of Well	Diam. of Discharge	Diam. of Air Line	Submersion of Air Line	Operating Pressure	Draft of Well	Total Lift	Gals. Water Per Min.	Cu. Ft. Free Air Per Min.	Cu. Ft. Free Air Per Gal.
	Ins.	*Ins.*	*Ft.*	*Lbs.*	*Ft.*	*Ft.*			
1	10	2½	65.2	60.0	18.5	73.9	974	336	0.345
2	10	2½	63.2	57.5	13.9	77.2	883	332	0.376
3	10	2½	63.4	58.5	15.0	78.1	603	347	0.576
4	10	2½	66.1	57.5	17.3	68.9	701	307	0.437
6	13	3	....	73.0	41.6	120.6	1410	514	0.364

At the time the test of well No. 3 was made the well casing only extended into the trap 24 inches. This has since been raised and the flow very materially increased without an increase of the air supply. There has since been no opportunity to take accurate measurements.

The flow of well No. 6 has also been increased to 1,750 gallons per minute, but no accurate tests made as to air per gallon.

Since the operation of this new plant has been so successful we feel that the water question has been permanently settled, as it will only be necessary to erect plants similar to this in different sections of the city whenever the present supply is inadequate to fill the demands of its rapid growth.

The quality of the water here is acknowledged to be as near perfection as that of any other public water, and the only objection heretofore existing was that the iron in it would stain china or porcelain vessels; but since the operation of this new air lift plant this objectionable feature has disapppeared, and the water forms no discoloration whatever, but is as clear as a crystal after having been drawn several days.

Citizens of Memphis are very proud of its water and its water plant, and it has certainly proven a very successful illustration of municipal ownership.

EVANSVILLE MECHANICAL FILTERS

Plant Now Under Construction—Lime, Iron Sulphate and Hypochlorite of Lime as Coagulants—Foundation Work Unusually Difficult

By F. H. STEPHENSON, Assoc.M.Am.Soc.C.E., Resident Engineer

THERE is now under construction at Evansville, Ind., a twelve million-gallon purification plant for the filtration of the municipal water supply.

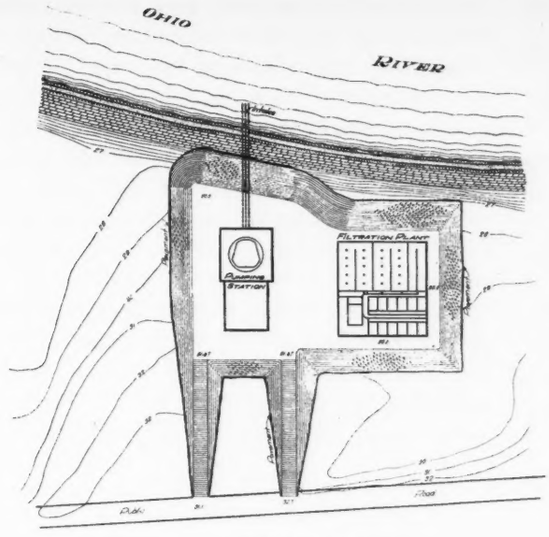
Evansville has a population of about 63,000. In 1872 a municipal water works system was built. The source of supply was and is the Ohio River. In 1900 the point of intake was moved farther up stream from the city, and a new pumping station erected on the flats bordering on the river. Upon this site adjoining the new pumping station the filtration plant is now under construction. The means of purification, embodying the most recent practice, is similar in most respects to a number of recent plants. An interesting structural feature of the installation is a rather novel solution of the foundation problem.

The filters are to be of the mechanical type. It is proposed to use as coagulants, lime, iron sulphate and hypochlorite of lime. Water from the Ohio River is to be delivered by low lift pumps to a double raw-water canal extending across one end of the coagulating basins. This canal will be equipped with hydraulically operated sluice gates, so arranged as to allow the raw water to be admitted to and drawn from any one or all the coagulating basins. This permits of varying periods of coagulation. Provision is made for the application of coagulant just prior to any of the periods of rest.

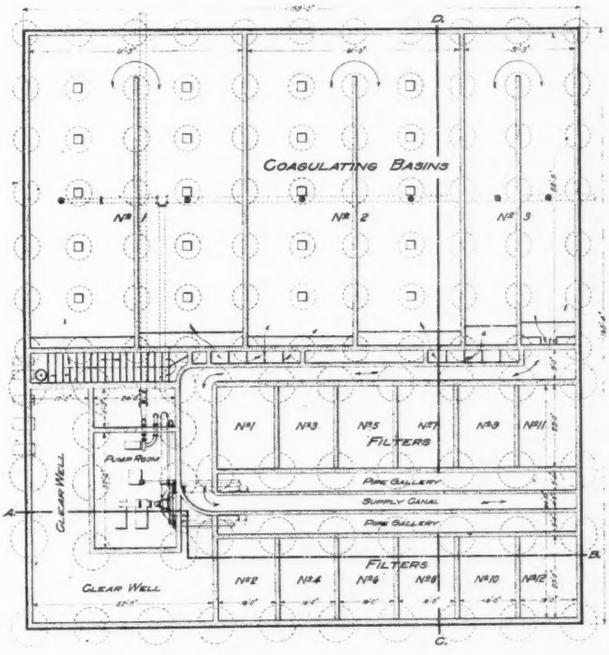
The coagulating basins, three in number, are to be of concrete of the dimensions shown on the drawing. Basins one and two have a capacity of 1,000,000 gallons each, and basin three of 500,000 gallons. Their combined capacity of 2,500,000 gallons equals five hours total filtering capacity. By operating the basins singly or in combination, the period of coagulation may be made one, two, three, four or five hours. The basins will be provided with blow-off valves connected with a drain underneath for carrying sediment to a waste water sump, which in turn will discharge to a drain leading to the river at a point several hundred feet down stream from the intake for the pumps.

At the outlet end of each basin there will be a trough with its edge about eight inches below high water. Coagulated water will be drawn over the trough edge and conducted by a concrete supply canal to the filters. From the supply canal the water may be taken through a cast-iron inlet to any of the twelve filters.

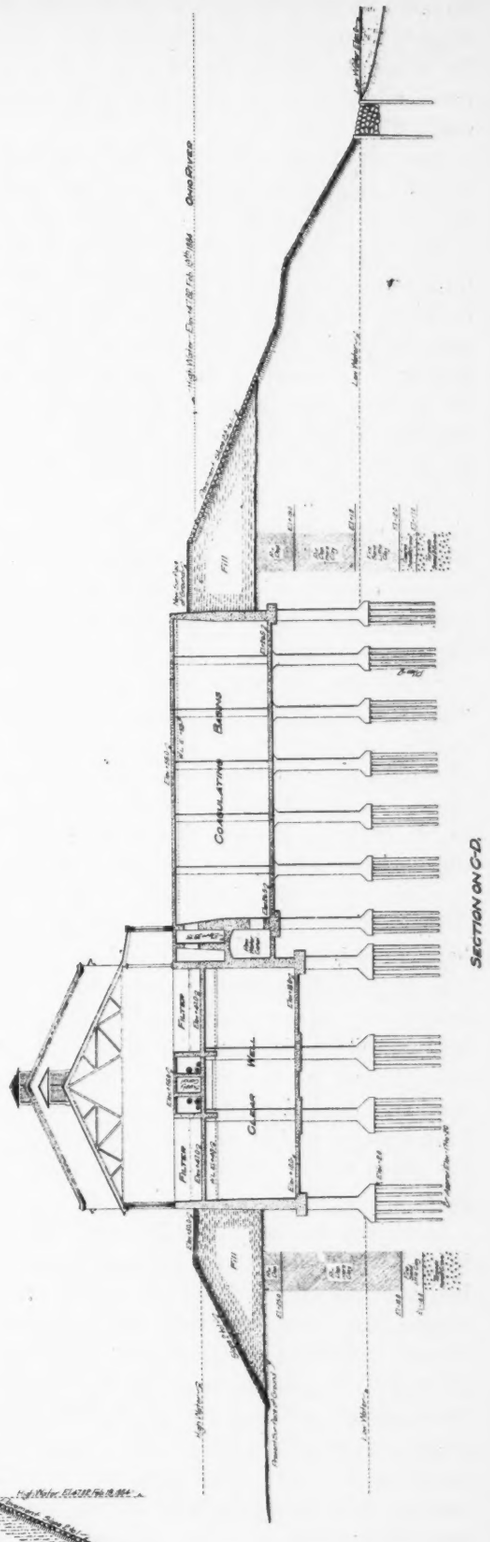
The filters will be rectangular concrete tanks of dimensions shown on the plan and have a filtering area of 368 square feet each. On the bottom and in the center of each filter will be laid a special cast-iron manifold pipe, and leading each way from this manifold on 10-inch centers will be 2-inch galvanized lateral pipes extending nearly to the side walls of the filter. The ends of the 2-inch pipes will be capped. At in-

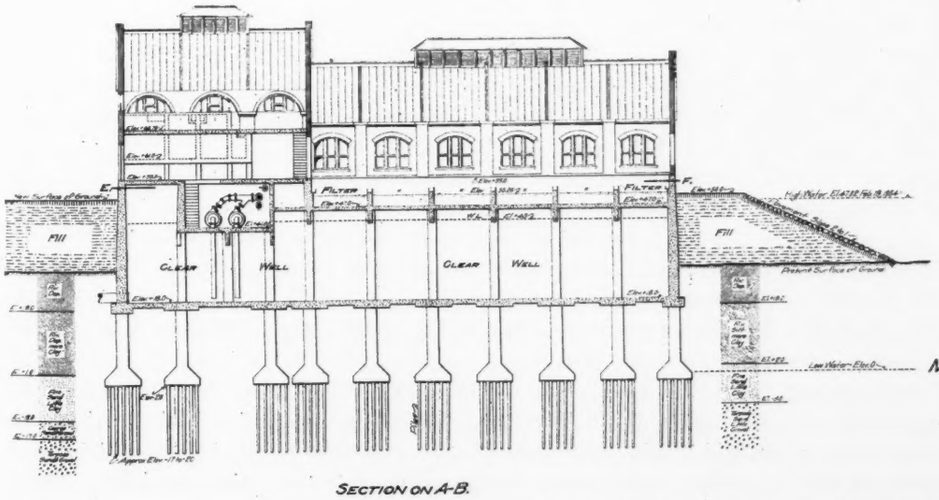


Sketch Showing
GENERAL ARRANGEMENT OF PLANT



PLAN





SECTION ON A-B.

Plans for
MECHANICAL WATER FILTRATION PLANT
for the City of
EVANSVILLE, INDIANA

JOHN W. ALVORD
CHAS. B. BURDICK
Engineers

NORWOOD ENGR. CO.
Contractors
A. BENTLEY & SONS CO.
Sub-Contractors

PLAN AND SECTIONS OF EVANSVILLE WATER FILTRATION PLANT

tervals of about 6 inches the lateral pipes will be tapped on top to receive slotted tube strainers. Over the strainers will be placed 9 inches of specially prepared and graded gravel, followed by 30 inches of prepared filter sand.

The coagulated water will enter the filters from the supply canal, pass through the sand and gravel into the strainers, laterals, and manifold pipes and thence to the clear well. The clear well is located below the filters and also extends under that part of the building in which are located the pump room, offices, etc. The capacity of the clear well when full is about 1,800,000 gallons. To regulate the rate of filtration there will be in each filter outlet a rate controller which will maintain a uniform flow at all times. This device will be capable of adjustment for various rates of flow.

The filters will be washed by a reverse current of filtered water assisted by air jets. The water pressure will be supplied by two steam-driven 10-inch centrifugal pumps which draw their supply from the clear well and discharge to cast-iron pipes connected with the manifold and strainer system of each filter. A steam-driven air compressor will supply the air for washing the filters. The air system for each filter will consist of three lines of pipe laid lengthwise of the filter directly over the gravel layers. From these pipes there extend laterally ⅜-inch brass tubes placed 4 inches center to center. These tubes are slotted every 2½ inches. By this arrangement air may be applied in conjunction with the water, or separately as desired. To take away the wash water and dirt, each filter will be equipped with cast-iron overflow boxes of sufficient size to permit washing at the rate of 10 gallons per minute per square foot of filter area. Sand catcher boards will be placed at the overflow boxes to prevent loss of sand while washing. The overflow boxes will discharge to a drain leading to a sump. At times of high water it will be necessary to pump the water from the sump and a pump will be provided for that purpose.

With the exception of the filter inlet valve, which is to be of the butterfly type, all filter valves will be hydraulically operated. Their movements will be controlled from operating tables built of marble slabs with bronze trimmings and panelled oak fronts. On each table will be placed the operating handles, indicators and a gauge showing the loss of head in the filter. A table conveniently placed will contain apparatus for sampling the raw, coagulated and filtered water, and gauges showing the height of water in the clear well and supply canal.

The chemical solutions will be prepared on the upper floor at the south end of the building. The lime will first be slaked in an iron tank about five feet in diameter and 3.5 feet high. The tank will be fitted with an agitator with spring steel teeth, driven by a Pelton water motor. The discharge from the slaking tank will be to either of two lime-solution tanks, which will be built of concrete 12 feet by 14 feet in section and 12 feet 9 inches high. They will be supplied with agitators and discharge to an orifice feed box in which there will be adjustable orifices discharging into pipes, which carry the solution to the points of application to the raw water. There will be two concrete iron solution and two concrete hypochlorite solution tanks equipped with agitators and orifice feed boxes. Special fibre pipe will be used for carrying these solutions to the point of discharge into the raw water. Sufficient room is planned for storing sixty days' supply of chemicals.

At the south end of the building there will be fitted up a laboratory for daily analyses and testing of both raw and filtered water. The general design and arrangement of the plant are such as permit of future extension to 18 million gallons daily capacity.

FOUNDATIONS

The conditions affecting the foundations are as fol lows: The extreme variation in the river level amounts to 48 feet. The natural banks of the river lie about 30 feet above low water with the "high water" bank about half a mile to the eastward, producing at times of high water an entirely flooded bottom. The floor level of the new pumping station is 53 feet above low water, the building walls being "floated" on a carefully prepared rolled fill about 20 feet above the level of the river bottoms. During high water the station is accessible from the city only by boat. The pumping engines are erected in and on a masonry pit 61 feet deep, which was sunk by caisson and rests on a sub-stratum of gravel about 22 feet below low water.

The floor levels of the adjoining filtration plant are practically the same as in the pumping station. The general arrangement of buildings and grounds with plan and sections of the proposed filtration plant are shown on the accompanying plan.

At the site of the plant the underlying material consists of brown river silt varying somewhat in depth. Its bottom averages about 2 feet below low water. Interspersed with this deposit are accumulations of organic matter, making it an uncertain foundation. Below the river deposit to about 22 feet below low water is fine sand, gradually merging into a coarser material containing some gravel.

Experience upon this site demonstrated that no stable foundation could be procured higher than 22 feet below low water and it is upon this stratum of comparatively coarse sand and gravel that the foundation piles for the new structure rest.

The extreme variation between high and low water necessarily requires considerable depth of basins. Elevation 26.5 was selected for the floor level of the coagulating basins, and elevation 18 for the floor level of the clear water reservoir. These elevations refer practically to low water. It will thus be observed that the use of wooden piles alone is hardly permissible, owing to their liability to decay from alternate submersion and drying out as the level of the river rose and fell. To have utilized piles alone would have required a pile length of not less than 50 feet. The use of concrete piles was considered, but the idea was

abandoned after working out the foundation plan as shown on the drawings and testing its practicability by the construction of several pits.

The plan adopted and now partially constructed, is to support all structures, basins and equipment upon clusters of wood piles driven to an estimated resistance of 25 tons per pile in pits of 7 and 10 feet in diameter, terminating at elevation —2, at which point the pile tops are sawed off. The number of piles per hole varies from 7 to 24, the minimum distance between pile centers being about 2 feet. The pits are sunk by aid of a steel shield, the material being excavated therefrom by hand. The character of the surrounding material is such that infiltration is not serious when the river level is elevation 12 or less.

Circular reinforced concrete footings rest on the wooden piles and terminate in octagonal columns, which support the basins and structures. The columns are reinforced both vertically and by hooping and are 34 and 42 inches least diameter. Under the coagulating basins the columns are about 15 feet on centers and under the clear water basin they are spaced in rectangular shape about 17 feet by 25 feet on centers.

All floors and roofs are designed on the Turner "Mushroom" system. The design provides for the full effect of the upward pressure due to high water, amounting to about 30 feet head on the bottom of the clear water basin. The upward and downward loads are approximately equal, and to provide for this contingency, required some rather unusual and special design.

The entire structure is so designed that it is in no way dependent on the surrounding unreliable river deposit, which forms the surface sub-soil. All loads are carried to the piers and through them to the wooden pile foundation at elevation —2.

The plant is being constructed under the general plans and specifications of Messrs John W. Alvord and Chas. B. Burdick, hydraulic and sanitary engineers, Chicago, who are also in charge of construction.

Messrs. E. C. and R. M. Shanklin, civil engineers; Prof. F. E. Turneaure, M.Am. S.C.E., and Mr. Geo. H. Benzenberg, M.Am.S.C.E., have assisted in the study of special problems in the design.

The Norwood Engineering Company, Florence, Mass., has the general contract, including the details of design, and has sublet the building and structures to the A. Bentley & Sons Company, Toledo, Ohio.

The writer represents the supervising engineers as resident engineer.

Algae Removal at Sandy Hill

SANDY HILL, N. Y., when algæ first appear, shuts off the reservoir from the supply and has men rake down the banks of the tributary brooks and the settling tanks, following down as the water recedes. The detached matter is then discharged through a blow-off and flows into the river a mile away. This is done three or four times a year, and this, combined with causing the full supply to flow through the reservoirs, keeps the water free from algæ.

COPPER SULPHATE TREATMENT

Destroying Algae in Reservoirs by Its Use—Methods Employed at Middletown, N. Y.—Conditions Which Determine Amount to be Used

By IRVING C. BULL, Chemical Expert, New York City

ALGÆ growths have given water companies much concern during recent years and their removal have been accomplished by different methods with varying results. A growth of algæ renders a water supply unsuitable for domestic purposes even where highly efficent filtration plants are being operated. Filtration is not a remedy for rendering water supplies entirely free of disagreeable odors and tastes.

The most common form of algæ which is found gives to the water a fishy taste and odor which gradually increases in intensity as the season advances. This growth may appear at almost any season of the year, but the spring and summer months are the most probable times for these objectionable growths to appear in the water.

At Middletown, N. Y., we have treated with success the different water supplies for the past four years for the removal of algæ by the means of copper sulphate. These growths have always been those producing a fishy taste and odor. Copper sulphate has been the only method used at that place. It has been applied in strengths varying from one part of copper sulphate in one million parts of water, to one part in four million parts. The amount to be used must first be carefully determined, the amount depending upon the following conditions: The character and amount of algæ growth, the hardness of the water and the temperature of the water at the time of treatment. Too much or too little copper sulphate will greatly influence the efficiency of the treatment. When the proper amount has been determined and applied, the progress of the treatment will depend somewhat upon the character or kind of growth; the effect being noted in some cases as soon as three days and a total improvement at the expiration of ten to fourteen days.

The method used in applying the copper sulphate is, briefly, as follows: The copper sulphate is placed in bags of not too fine texture, about fifty pounds of copper sulphate to each bag. One bag is placed over either side of a boat, which is then rowed about, giving an even distribution of the copper sulphate. Where the growth appears the most abundant an extra bag is placed in the water over the stern of the boat. It is always necessary to secure an even distribution of the copper sulphate as quickly as possible.

Our experience with the three reservoirs at Middletown has been that the trouble from algæ growths has not always been due to the same forms of algæ; also, that the growths have not appeared at the same time of the year. During the present year trouble was experienced with reservoir No. 1, supplying the gravity system of filters. The growth here appeared in March and rapidly increased until the water was unfit for domestic use within two weeks' time. A copper sulphate treatment was at once recommended. The treatment was immediately made by order of the President of the

Water Commissioners, and within ten days' time the water was back in its normal condition, free of all of its objectionable qualities. The growth this year was the earliest one which we have experienced at Middletown during our five years' service with that board. Previous to this year the first growths have been noted during the latter part of May and the first part of June.

In addition to the removal of the algæ growth, there is another advantage in the treatment, which at once presents itself. This is in the operation of mechanical filtration plants. When the growth begins to increase to any marked extent in a water supply which is being filtered, the accumulation of the vegetable growth upon the filter beds becomes so great that it immediately stops the progress of filtration, and washing of the filter beds is at once necessary; three or four times the normal number of washings being often necessary. This, of course, increases the cost of filtration as well as lowers the twenty-four-hour filtration efficiency. After a copper sulphate treatment this accumulation of vegetable matter stops and the filters do not demand the extra amount of washing.

As to the proper time of treatment of water supplies, we would recommend that the most efficient results are to be obtained at once as soon as any indications are noted of an algæ growth. When the growths are allowed to advance the treatment must be necessarily stronger, and our experience has been that the excellent results are not so quickly obtained. It is not well to wait when growths are expected, but the trouble should be at once determined by careful examinataion.

In conclusion, it is to be understood that objectionable odors and tastes are not always due to algæ, but may be due to many other causes, as water is an excellent absorbent of gases, odors, etc. Therefore, copper sulphate treatment cannot be considered a universal method for eradicating odors in water supplies.

COPPER SULPLATE TREATMENT AT ALBANY

ALTHOUGH a large part of the water supply of Albany, N. Y., consists of sand-filtered water, about 10 per cent of it comes from Rensselaer Lake, which is mixed with about three parts of filtered water for supplying about one-third of the central portion of the city. This lake is divided into two branches of north and south by the tracks of the New York Central Railroad. The northern portion is generally shallow, and during the period of treatment was to a great extent shut off from the main or southern portion by a cofferdam placed there by the railroad company. The lake is very irregular in shape and the northern portion was divided into two branches and the southern in three. Although the northern portion was not in direct connection with the southern, yet it was deemed advisable to treat it, as it was abundantly seeded with algæ. On June 14, 1907, samples from the southern portion showed branch No. 1 to contain, per cubic centimeter, 2 Synedra and 14,500 Asterionella; branch No. 2 contained 660 Synedra and 4,820 Asterionella and 7,140 Anabæna, and branch No. 3 contained 1,110 Synedra, 6,570 Asterionella and 6,300 Anabæna. On June 19 and 20 the southern portion was treated with copper sulphate in the proportion of 1.5 parts per million, and on June 25 the water in the outlet was found to contain 110 Synedra, 230 Asterionella and 410 Anabæna. On the same day the northern portion was found to contain, in branches 1 and 2 respectively, 100 and 50 Asterionella, 0 to 85 Synedra and 7,000 and 11,850 Anabæna. On July 1 this portion was treated with two parts of copper sulphate per million and two weeks later the outlet show 45 Asterionella, 160 Synedra and 560 of other algæ; while on July 23 no algæ whatever were found here; but on August 6, Anabæna were found to the extent of 740, and 1,850 on August 19. In the southern portion, on July 15 branch 3 showed no Anabæna, but Synedra were plentiful. On July 23 also there were no Anabæna, but by the 30th 200 per c.c. were found present. On August 6 there were found in branch 3 2,850 Anabæna, 1,570 Synedra and a few other algæ.

On August 7, 2½ parts per million of copper sulphate were added to the entire southern portion, and five days later no Anabæna were found, but 1,230 Microcystis. On August 19 branch 3 showed 1,845 Anabæna. All through this period a severe drought was being experienced, and conditions were most favorable for the propagation of spores. Meantime in another reservoir which had not been treated Synedra were found in the following quantities:

July 10	112	Aug. 6	3,800
July 15	600	Aug. 12	2,725
July 23	2,240	Aug. 19	1,330
July 30	2,435	Aug. 28	570

At no time during the summer was an odor noticed in the distribution system, except at one time, when a conduit which had been allowed to stand full for some time during very warm weather was first opened again. During the period of stagnation the organisms contained in the water disintegrated, liberating an aromatic oil which was noticed by the consumers for several days afterward.

Experience with copper sulphate during 1907 showed that its use will eliminate odors caused by algæ. In spite of the large amounts used, however, no dead fish were found floating on the surface other than bull-heads, which are always found dead in large numbers at this time of the year. It was also shown that application of the copper sulphate must be made every two or three weeks to procure immunity from Anabæna.

During 1908 the entire gravity supply was treated with copper sulphate, and for the first time the entire system was free from odor during the summer months. Very litle sulphate was required, and the greatest number of applications was three, at Rensselaer Lake. The entire expense of the work was as follows: 950 pounds of copper sulphate at 7 cts., $66.50; labor and car fares, $29.31; total, $95.81. The amount of water treated was approximately 200 million gallons, and the cost was therefore about 48 cts. per million gallons treated. During this summer at Rensselaer Lake, where conditions were the worst, the total amorphous matter increased to 360 units per c.c. on July 13; copper sulphate was added on July 16, and on July 20 amorphous matter had dropped to 40 units.

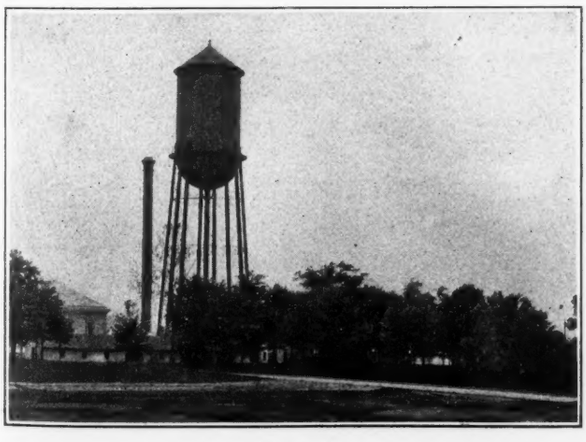
LOUISVILLE WATER PURIFICATION PLANT

Original Coagulation Tanks and Filters—Shortcomings of Both Developed by Operation—Changes in Filters—Additional Coagulation Basin—Reinforced Concrete Wash Water Tank and Reservoir

SOON after the appearance of this article Louisville, Ky., will probably have the supply of pure and clear water so long waited for by its citizens. As long ago as 1890 the then Chief Engineer and Superintendent of the Louisville Water Company, Mr. Chas. Hermany, pointed out the desirability and necessity of purifying the Ohio River supply. This was recommended each year in his report, until finally, in 1895, the Water Commissioners decided to engage expert aid in the study of the problem, and in that year employed Mr. Geo. W. Fuller to conduct experiments and make recommendations. His very complete report on the situation is known to every one who has studied the water purification problem. This investigation was carried on until the year 1898, and cost upward of $50,000.

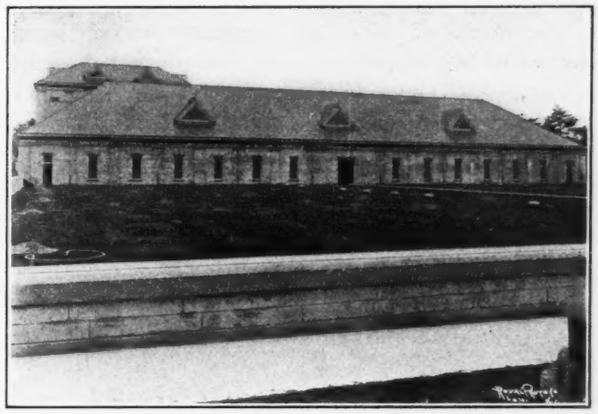
In August of 1897 the Water Works Commissioners passed a resolution to proceed to the construction of works necessary to properly purify the water, and the report for that year states that "it is expected the work can be completed by December 31, 1899, at a cost of less than $500,000." In 1898 a contract was let for the construction of a filter house and clear water basin, to be completed December 31, 1899; but delays in the work caused it to be a year later before it was completed. Contracts were let also for the construction of a pumping station, filters and coagulant house and tanks. Other delays ensued, so that the plant as originally designed was not completed until about January 1, 1908, and then at a cost of nearly one and one-quarter million dollars.

The coagulation facilities and the filters as originally designed were essentially as follows: The coagulation house contained mixing tanks for mixing the sulphate of alumina which was to be used, and a large steel tank in which the coagulant and raw water were to combine, and where it was expected that considerable sedimentation would take place. The consumption of water was so large, however—about 22,000,000 gallons a day—that the water passed through this tank so quickly as to permit it to serve simply as a mixing chamber.



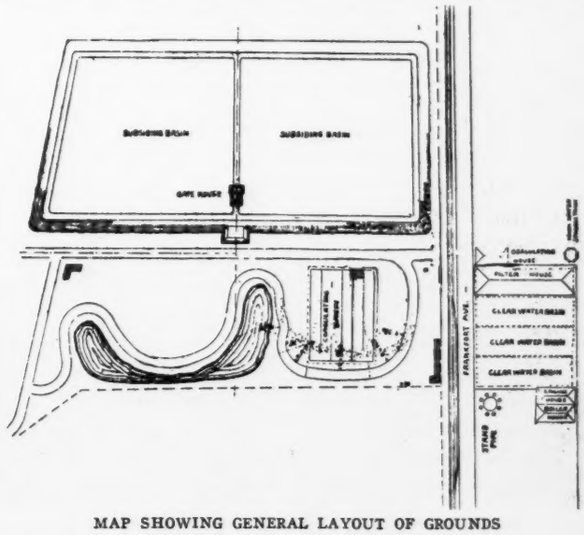
LOUISVILLE WATER TOWER
Site of proposed coagulation basin in foreground

The filter house contained three filters, each 30 feet 3 inches by 146 feet 11⅞ inches, and was of such size that a duplicate set could be built at the other end when necessary. These filters were built of steel, supported by concrete columns which extended through the clear water well (which was partly beneath the filter house) and were in action somewhat similar to the sketch (page 992). A wire screen was supported on I beams. On this was placed a layer of gravel, and above this, without



LOUISVILLE FILTER HOUSE
Roof of coagulation house appears at the left. Ventilators of clear water basin in the foreground

separation, a bed of sand. The necessary piping for furnishing and carrying off the water was supplied. The water was to go from the filters to the 25,000,000-gallon clear water reservoir, and from there to the pumps, which supplied the city. To the supply line was connected the largest and highest water tower in the world as an equalizer. (This tower was described in the MUNICIPAL JOURNAL AND ENGINEER about a year ago.) The photograph on page 993 shows the top of the filters. Before the changes (to be described later) were made these filters contained no cross troughs or brac-



MAP SHOWING GENERAL LAYOUT OF GROUNDS

ing, but were simply large, open tanks. It was planned to use water for washing the beds directly from the main supply line and to agitate the sand while in suspension by means of a three-layer wire screen. This screen is shown suspended from the crane toward the upper left-hand corner of the picture, at A.

In February, 1908, the filters were operated for two or three days, but not at all satisfactorily. The principal weaknesses developed were: First, so little sedimentation took place before the water reached the beds that they rapidly clogged. Second, the beds were so large that good distribution of filtration could not be obtained. The distance from the center of the beds to the entering and wash water discharge weirs was approximately fifteen feet. This made it take a long time for the dirty water to travel from the center of the bed to the overflow, thus very materially increasing the amount of wash water necessary and the time required for cleaning. Third, trouble was experienced in washing the bed because the water pressure was not uniform. The construction of the beds was such that the pressure of the water was not distributed uniformly, and the water would break up one section of the bed without stirring the sand in others. Also the wire screen previously mentioned was found to be of no service in cleaning.

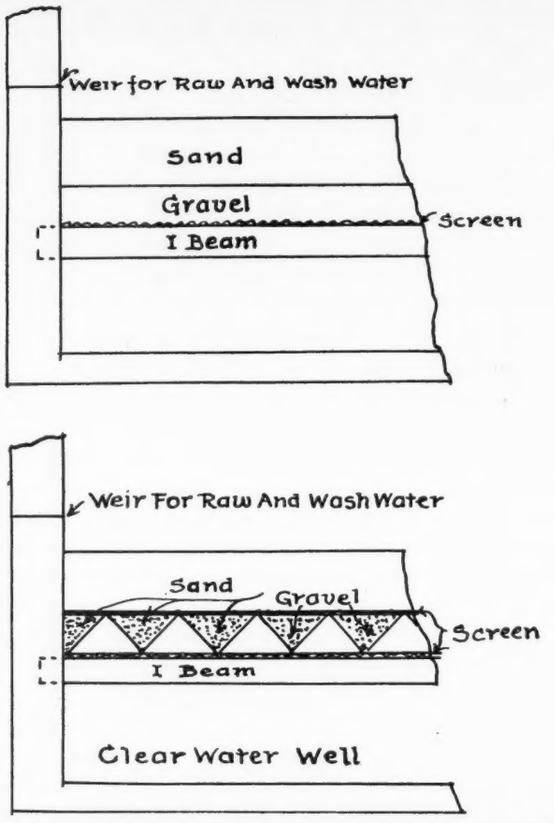
As soon as these faults were discovered, steps were taken to remedy them. Soon after this Mr. Hermany died, and in August, 1908, Mr. Theodore A. Leisen, formerly Chief Engineer of the Wilmington, Del., Water Works, was appointed Chief Engineer and Superintendent, and has carried on the work of remodeling the plant. Mr. Webster Gaylay has been connected with the filter work since its inception, with the exception of one year, and Mr. C. M. Puke has been assistant engineer in charge of grounds and piping.

Some of the changes made in the filters are plainly shown in the photograph. Each of the three large beds was divided into two, the division being where, in the view, the man is seen sitting. In each of these smaller beds nine cross distributing troughs were placed. These will give a much more even distribution of water, and also necessitate a much shorter travel of wash water. These troughs are spaced and kept in position by the rods shown. In placing them many of the seams of the steel filters were started and the only thing now delaying the operation of the plant is the caulking of these, which is now being carried on.

The original screen was left on the I-beams, but placed over this and supported by the beams were built triangular shaped concrete beams. Gravel was put in the trough-like spaces between these and another screen placed on this, which will keep the gravel and sand separate.

Necessary gauges are provided for showing loss of head, etc. Part of the valves are operated by hand and part electrically; the latter being controlled from an operating platform at the end of the filter house.

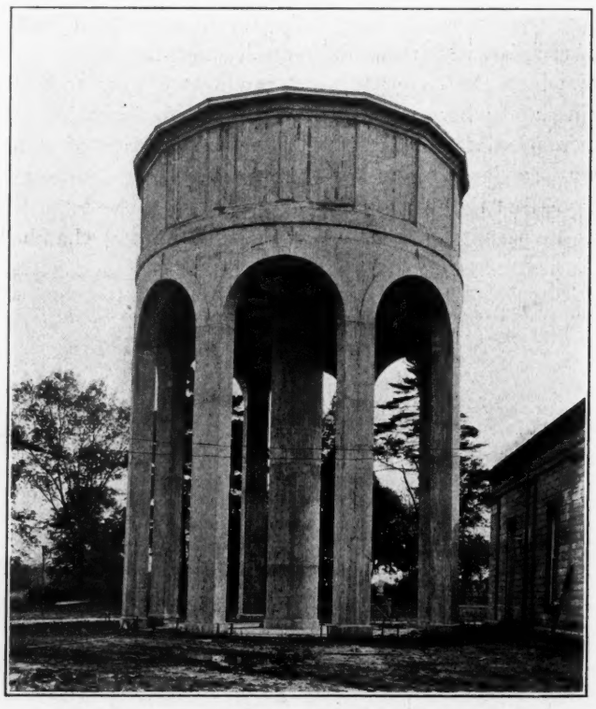
A wash water tower has been constructed entirely of reinforced concrete which will give a head on the wash



SKETCHES OF ORIGINAL AND MODIFIED CONSTRUCTION OF FILTERS

water of between five and seven pounds. Underneath this tower is a basin, into which the waste wash water will flow. This basin is provided because the drain is not of sufficient capacity to carry off the water as rapidly as it leaves the filter.

Bids were received June 1 for a coagulation basin of 12,500,000-gallon capacity. Until this is ready to use



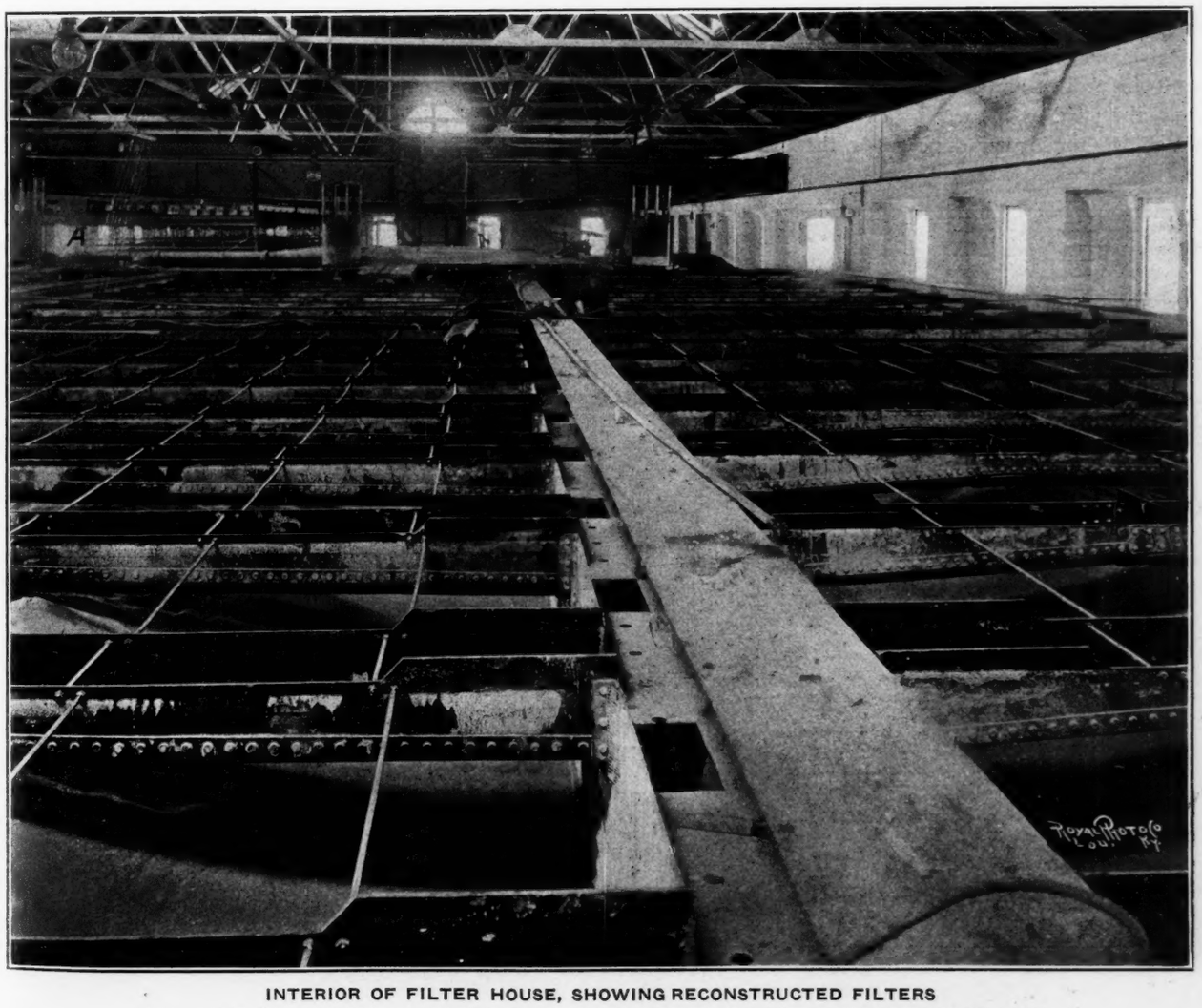
WASH WATER TOWER OF REINFORCED CONCRETE

one of the 50,000,000-gallon reservoirs will be used as a coagulation basin.

When the new coagulation basin is completed the raw water will be taken from the 48-inch pipe line running to the Crescent Hill filters through two 36-inch Coffin valves. A 4-inch pipe line will bring the coagulant from the coagulation house and introduce it at the float valves. It is proposed to use a 2 per cent solution of aluminum sulphate at constant head, but in varying quantity, depending on the condition of the water. The mixed water and coagulant is introduced into the larger of the two basins through several risers, and passes around the baffles to the end, where it enters a perforated pipe line. It can then pass through two other 36-inch Coffin valves to the filter supply line, or go through the smaller coagulation basin. Either of these basins can be used separately or they can be used as a single basin, depending on the necessity. If used together, the water will remain in them between eight and nine hours. The buildings of the Crescent Hill station, where this plant is located, are well designed. The filter house, coagulation house and pumping station are of concrete, while the gate house at the reservoir is of stone. The pumping station is equipped with the most modern boilers and pumps, three Holly pumps being installed. With the reconstruction of the filters that part also will be in excellent condition to furnish a satisfactory supply of water, the necessity for which is indicated by the fact that the river water sometimes carries as high as 6,750 parts of suspended matter per million.

FOUR VALVES TO CONNECT COAGULATION BASIN WITH PIPE LINE

When this plant is in operation Evansville will be the only large city on the Ohio River which has not a supply of filtered water, and that city is now building a filter plant as described elsewhere in this issue. Pittsburg has recently put in operation its slow sand filters, and Cincinnati has for nearly a year been receiving filtered water from its mechanical filter plant, as described in MUNICIPAL JOURNAL AND ENGINEER of October 5, 1908.



INTERIOR OF FILTER HOUSE, SHOWING RECONSTRUCTED FILTERS

The vertical cylinders seen near the further end are the two regulating valves raised from their pockets

RAPID FILTRATION AT WINFIELD

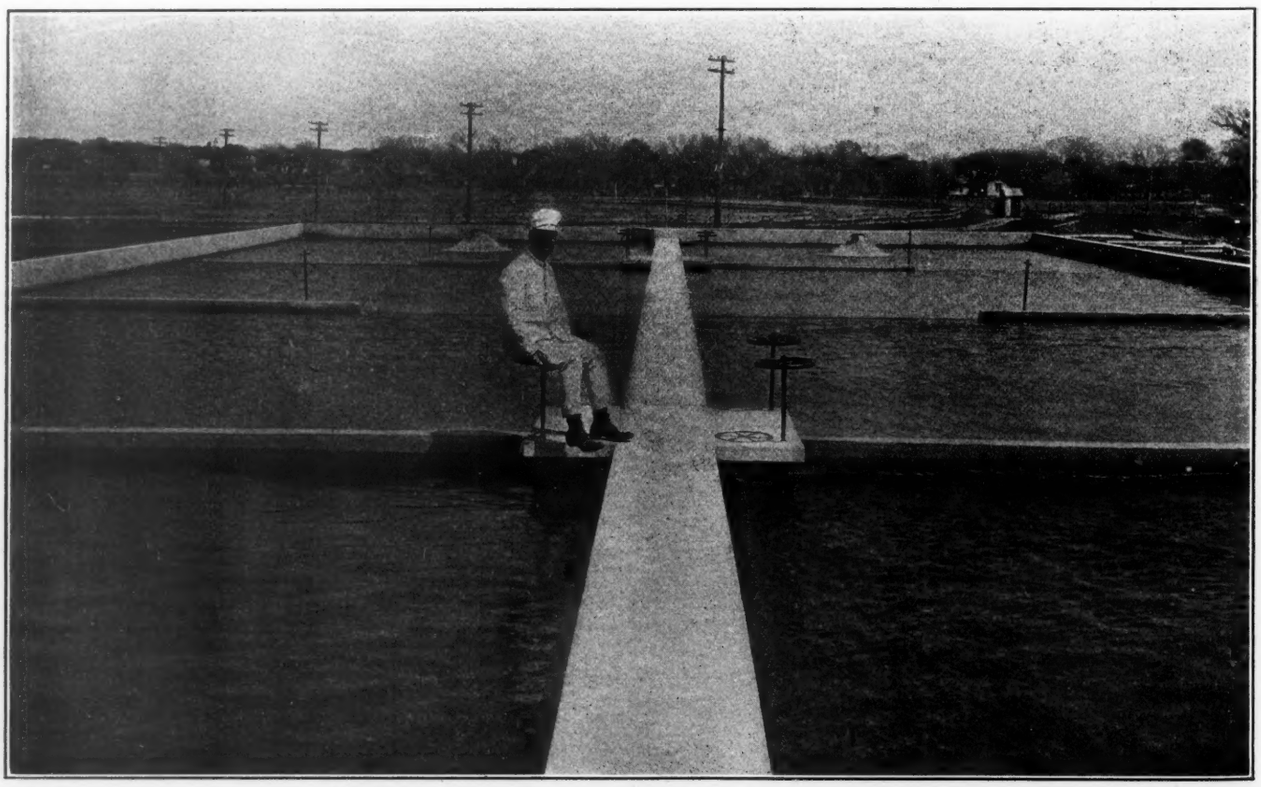
Municipal and Private Plants in Active Competition—Purification Plant for Former Recently Completed—Aerators, Settling Basins and Rapid Sand Filters.

IT is rather unusual for cities to have competing water companies, and when the rivalry for business reaches the stage that efforts are being made to supply water of a better quality, the competition, although ruinous from a financial standpoint, tends to result in supplying the consumers with water of exceptional purity. The city of Winfield, Kan., with a population of about ten thousand people, sought to acquire the water works plant then owned by a private company. Being unable to secure the works at what the city considered its fair value, bonds were voted and, after about six years of litigation, numerous injunctions and much ill-feeling between the friends of municipal and private ownership, the city's plant was placed in operation. The private water company secured its supply from the Walnut River and, with the aid of small settling basins and mechanical filters, attempted to obtain purification; with but little success, however, because of the small settling basins.

In order to secure the business of the private company by furnishing water of a better quality, the city secured its supply from wells. This was satisfactory for drinking, but too hard for domestic use and entirely unfit for boiler and manufacturing purposes. Moreover, the yield of the wells was not adequate to supply water for the growing needs of the city. Thus the private company held its own with the city plant, even though the latter offered lower water rates. In many streets the water mains were paralelled and at numerous street intersections four fire hydrants occur, one on each corner. Consumers were furnished with water at such low rates by the private company that, even though their moral support was back of the city, they did not feel justified in going to the additional expense of making new connections to the city mains.

To overcome the disadvantage of hard water and a limited supply, additional bonds were voted by the city for the purpose of taking water from the Walnut River and installing settling basins and a filtration plant. Consulting Engineers Burns & McDonnell, of Kansas City, Mo., had represented the city in the appraisement of the old plant and in designing the municipal plant, and they were again retained to design and supervise the new purification plant, which has recently been completed.

The water is pumped from the river by rotary pumps and discharged through aerators into reinforced concrete settling basins. The basins are divided into eight compartments by a main division wall through the center having four compartments on each side. Water flows from the aerators over weirs into and through the basins and passes on to four mechanical filters of one-half million gallons capacity each, thence to a concrete-lined clear water reservoir. Lime and iron are used as coagulants, this being introduced into the main just before it discharges into the basins. A water softening plant also is operated. The filters are of the sand, mechanically operated type. They are built of rein-



WINFIELD FILTRATION PLANT. VIEW FROM OFFICE

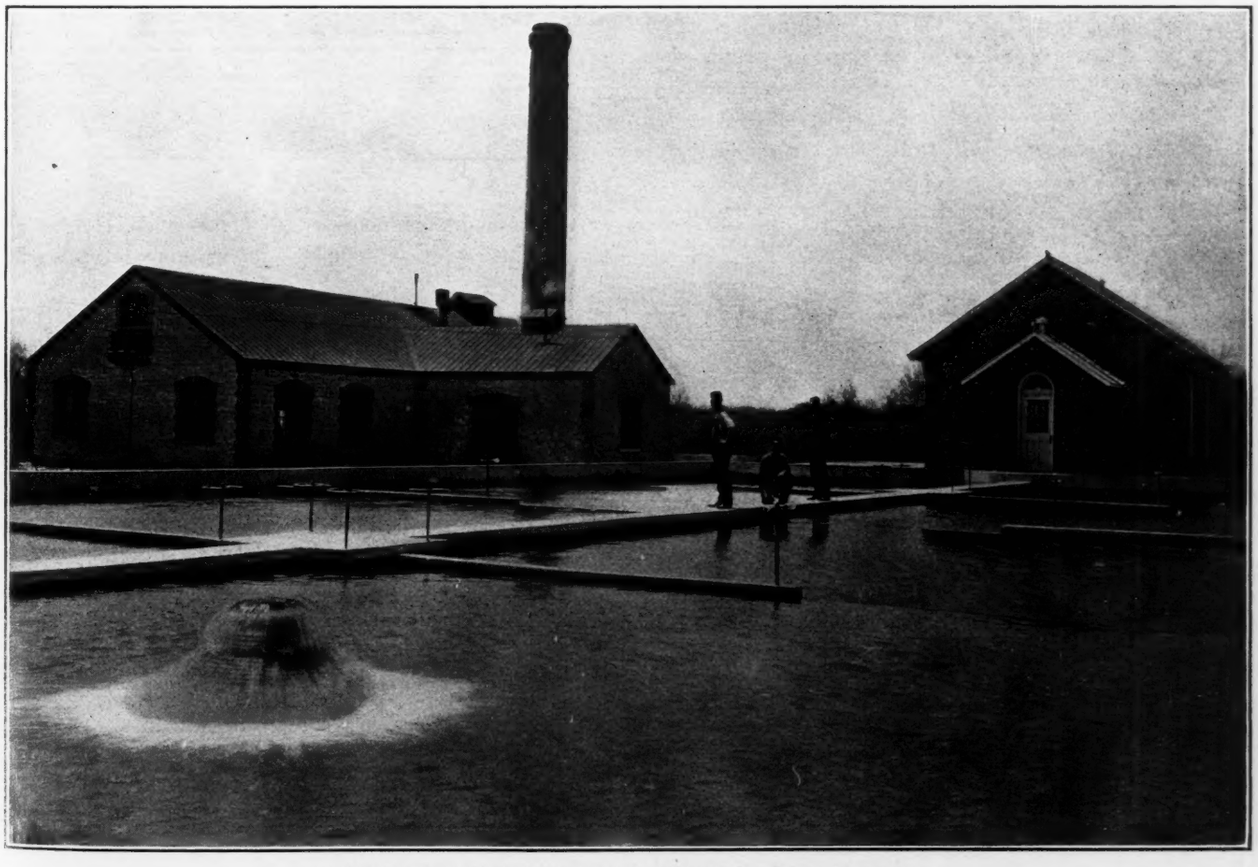
forced concrete throughout. An air wash is provided operated by a motor-driven blower. Wash water is supplied from the filtered water supply, both direct from the main and from a centrifugal pump, motor-driven. The pipe gallery contains the motor, centrifugal pump, rotary blower and the hydraulically operated valves. The filters are operated, cleaned, emptied, filled and handled entirely from the marble top operating tables, one of which is provided for each filter, thus making it unnecessary during the entire operation for the operator to leave the filter stands.

A coagulant pump and water sample pump also are provided. The filters are each provided with the loss-of-head gauges and all other necessary controlling devices, insuring ease of operating, quick cleaning and a close observation of the results. A coagulating room adjoins the filter house, and a laboratory equipped for daily analyses is provided.

The settling basins, filters, clear water well, floors and almost every part of the plant are of reinforced concrete design, corrugated bars being used in the reinforcing. The concrete was deposited wet in an effort to make the entire structure waterproof and the results proved very successful. The concrete was of a one, two and four mixture, Dewey Portland cement being used. The work was prosecuted during the winter months, yet the entire construction is entirely free from cracks. The work is in the charge of Mayor Charles M. Wallace and a commission outside of the Council consisting of A. S. Wilson, H. A. Caton and P. H. Albright, who have taken special pains that the entire plant and its surroundings shall convey to the mind of the visitor and of consumers their recognition of the importance of cleanliness and purity of the drinking water. The pure, sparkling, filtered water flows through an observation glass alongside of the brown, turbid, raw river water, conveying at a glance a comparison illustrating the results obtained. An attendant uniformed in white, in constant watch of the operation and careful of the results, lends confidence in the safety of the drinking water, and the purity of the water has directly been the cause of many new connections to the municipal mains.

After the successful results at purifying were generally known, the private company made concessions to the city for the sale of its works, and on April 27 the city voted by a decisive majority to issue $65,000 bonds to buy the plant of the Winfield Water Company; the city, although it had expended $150,000 on its new plant, being still confronted with ruinous competition and litigation.

The entire construction of the municipal works was by contract, the contractor being George H. Keifer, of Oklahoma City, Okla., and Burns & McDonnell were the engineers. Approval of the plans by the State Board of Health was required by the Kansas Water and Sewerage Law, and the engineers feel indebted to the officials of this board for the many valuable suggestions made throughout the work in an effort to produce a water purification plant that would be a model for other towns of the State having similar water supplies.



WINFIELD FILTRATION PLANT. AERATOR IN FOREGROUND

SYSTEM IN MAINTENANCE OF WATER PIPE IN CHICAGO

Method of Making Repairs and Extensions to Distribution System—Forms Employed in Supervision of Work and in Keeping Records of This and of the Material Used—Testing Gate Valves

By ROY S. SPALDING, Assistant Engineer, Water Pipe Extension Division

The water distribution system of the City of Chicago consists of 2,188 miles of cast iron water pipe of various sizes, from 4 to 48 inches in diameter. The maintenance and extension work on a system of this size embraces a good many features that will be of interest to water works engineers and superintendents, and it is the purpose of this article to describe some of those features.

The entire water works system, including cribs, tunnels, pumping stations, water mains and service pipes, is under the direction of Mr. John Ericson, City Engineer, who is in charge of the Bureau of Engineering.

The supervision of all work necessary to operate, maintain and extend the distribution system rests with the Water Pipe Extension Division, in charge of Mr. H. L. Lucas, Superintendent, which is a division of the Bureau of Engineering. For the prosecution of this work in the field the city has been divided into eight districts, each in charge of a district foreman, and each having an office centrally located, from which the work is handled. The district foremen report directly to Mr. John P. Allen, Assistant Superintendent, who is in charge of the construction and repair work.

When it becomes necessary to do any new work, such as laying pipe or setting a valve or hydrant, an order is made out on a blank provided for that purpose, which describes the work and gives an estimate of the cost.

(In addition to general head, order number, etc., this reads)

.....Foreman. Dear Sir: You are hereby directed to .....

On From To Length Diameter

and charge to.....

Estimated cost: Labor
Material
Teams

Total .....

Supt. Water Pipe Extension

When reporting labor and material used on your daily sheets DO NOT FAIL to mention this order number. On completion of this order notify this office on regular Foreman's report.

This order is signed by the Superintendent, and is made with four carbon copies, the original going to the district foreman, one copy to the mason foreman, and one to the Assistant Superintendent, one to the pipe yards, and one remaining in the office. If the job consists of pipe laying a plat is drawn up, showing the pipe line to be laid, the connections with existing mains to be made, the location of valves and hydrants, and also giving a bill of material. All orders, plans, estimates of cost, etc., are prepared by the Engineering Department, under the charge of Mr. H. S. Baker, Division Engineer. When the order is ready to go out a record is made of it on a card, which shows a full description of the job, and the estimates of cost in detail. This card is then filed, and when the job is completed a bill of cost is furnished by the bookkeeper and entered on this card.

Location Dist. No.
Character of Work
Charge Order No. Drawing No. Date
Size of Pipe Feet of Pipe (estimated) (actual)
Number of Valves—set Number of Hydrants—set
" " " —replace " " " —replace
Number of Service-Pipes to be reconnected Work completed

COST OF LABOR			COST OF MATERIAL		
Item	Estimated Cost	Actual Cost	Item	Estimated Cost	Actual Cost
Supervision			Pipe		
Calkers			Special Castings		
Laborers			Valves		
Mason Labor			Hydrants		
Tappers			Lead		
Plumbers			Mason		
Miscellaneous			Miscellaneous		
Teams					
Mason Teams					
Total			Total		
Av. per foot for Labor			Av. per foot for Material		

These bills of cost are compiled from foremen's daily report sheets by the clerical force under the direction of Mr. Charles H. Goll, Chief Clerk. From the entries in the card index it is possible to analyze the cost of new work and ascertain the reasons for high cost.

Water Pipe Extension Division.

COST SHEET.

_____ 190__

Statement showing amount of pipe laid daily and average cost per foot.

Order No.	Bill.	LOCATION	Laid this Day	Size	Total Laid	Lead	This Day's Cost	Total Cost to Date	Cost per Foot	REMARKS

Signed: _____

All finished work is reported to the office on a blank form, which gives a complete description of the work.

Order No.
W. A. Notified
Checked
Entered in Atlas
Book Page
Entered Plat No.
Atlas Checked
Cost Checked

WATER PIPE EXTENSION DIVISION
BUREAU OF ENGINEERING

Chicago, 190

To the Superintendent of Water Pipe Extension:
Sir:—The Water Pipe was laid, lowered, taken up, abandoned 190

ON	FROM	TO	LENGTH	DIAM.

Pipe used for hydrant branches

Location of Pipe feet from line of street.

HYDRANTS

SIZE	LOCATION

VALVES

SIZE	LOCATION

NUMBER AND SIZE OF SPECIAL CASTINGS USED

SIZE AND LOCATION OF CONNECTIONS WITH EXISTING MAINS

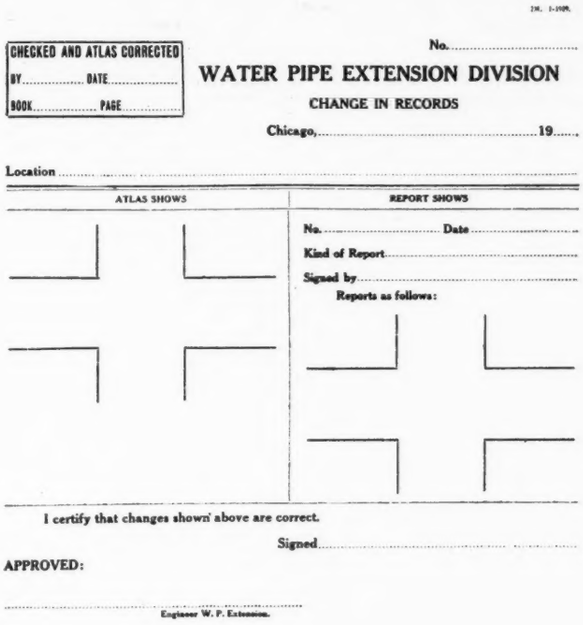
FOREMAN

All reports must be on file in W. P. Ext. Office within 48 hours after completion of work. Unless above information is fully given, and instructions complied with, reports will not be accepted.

INSTRUCTIONS TO FOREMAN—Above report must be made by the foreman personally, and be written in duplicate. Make a sketch on the form provided on the back of this sheet to illustrate any difficult connections.

From this report the plat of the new pipe line is made on the atlas or map. These atlases are seven bound books, containing the plats of the whole city on a scale

of 200 feet to the inch. This scale was so small that it was necessary to keep a plat of special and difficult connections in a separate book on a larger scale. There is at present in the course of construction a set of maps covering the entire city on a scale of 100 feet to the inch. With this scale it is possible to show all connections on the same sheet. These maps are made on tracing cloth, which makes it possible to keep a set of blueprints at different locations as a precaution against loss of the records in case of fire. It is also very useful at times to have a blueprint of any section of town, showing all mains, valves and hydrants, which can be taken out for use in the field. A full set of these prints will be kept in each district office.



CHECKED AND ATLAS CORRECTED
BY..... DATE.....
BOOK..... PAGE.....

No.....

WATER PIPE EXTENSION DIVISION

CHANGE IN RECORDS

Chicago,..... 19.....

Location .....

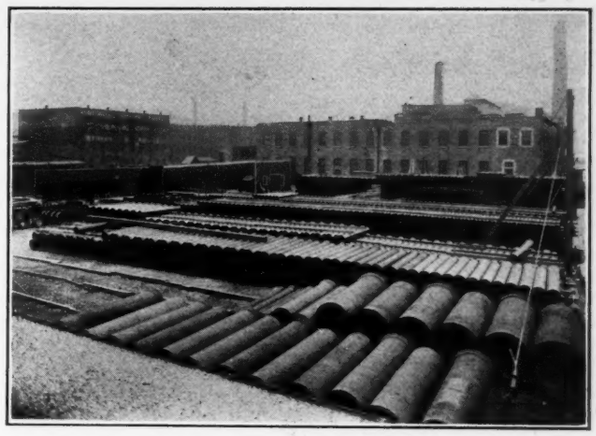
ATLAS SHOWS	REPORT SHOWS
	No..... Date.....
	Kind of Report.....
	Signed by.....
	Reports as follows:

I certify that changes shown above are correct.

Signed.....

APPROVED:

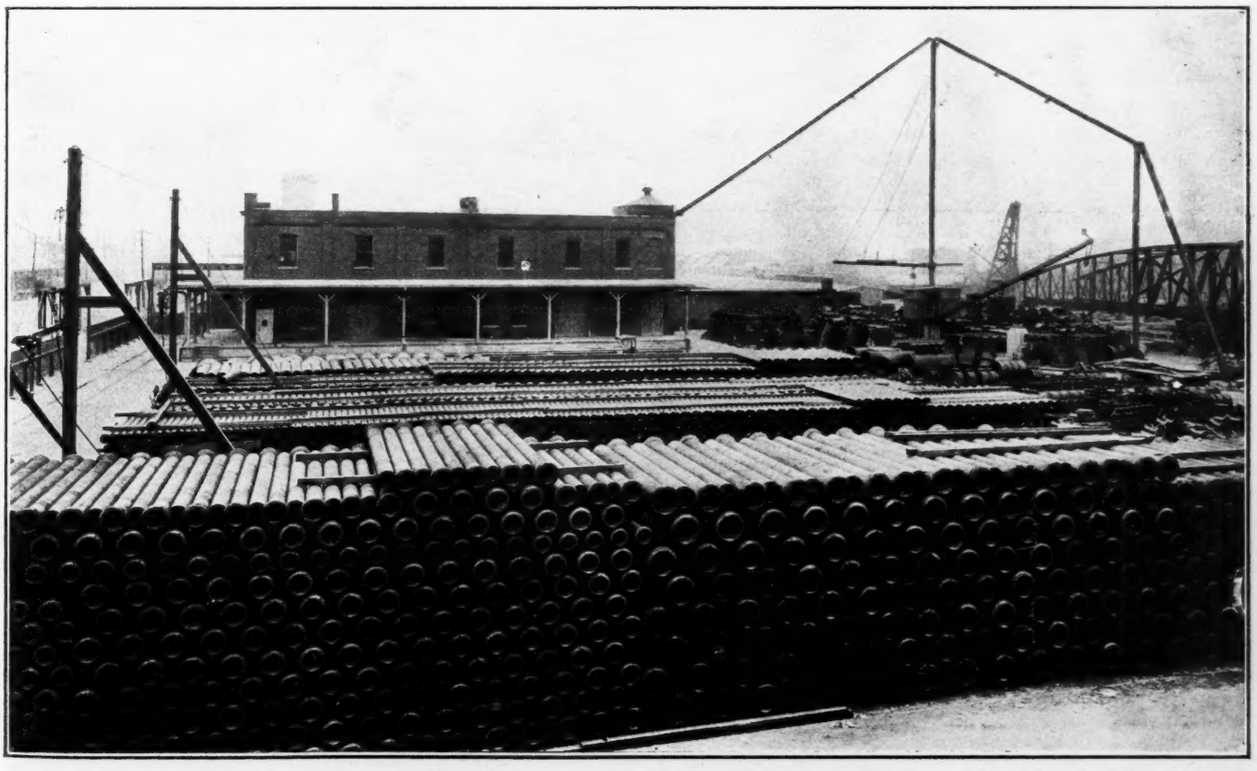
.....
Engineer W. P. Extension.



PIPE YARD B, ANOTHER VIEW

When it is found that the atlas or map is in error regarding the connection or location of some main, valve or hydrant, a description of the change is made out on a printed form, which then becomes an order to the draughtsman to make the correction. No additions or changes are made on the maps without a written order.

The pipe yards or supply yards are four in number, and are located at points convenient for reaching all parts of the city. These yards are under the management of Mr. George R. Bard, Superintendent of Pipe Yards. The principal yard is located on Ashland avenue south of Twenty-second street, and carries a large stock of material. There is a two-story brick warehouse at this pipe yard, which contains the office of the yard foreman. In addition, it contains a plumbing shop,



PIPE YARD B, ASHLAND AVE., SOUTH OF 22ND STREET

PIPE-LAYING DERRICK

storage room for valves in the basement, cement storage and miscellaneous material. In another building is located the carpenter shop, where all the carpenter work for the division is done. This yard is also well supplied with derricks. A five-ton stiff-leg derrick, with a 72-foot mast and 50-foot boom, is located in the rear of the yard warehouse, and is used for handling heavy special castings. This derrick is also supplied with a chain hoist hung from a carriage, which runs on an I-beam hung on the opposite side of the mast from the boom. This hoist is used for quick handling of the lighter castings.

Besides the derrick mentioned, there are two smaller ones, set near the switch track, and used for unloading pipe from the cars. This enables the city to buy pipe f.o.b. cars at the yards, and unload the cars with the regular yard force and at very small cost. This yard carries a force of only seven men to handle all the material which passes through it. Before the yard was equipped with derricks and rearranged it required a force of 18 to 20 men to do the work.

The equipment of the other pipe yards is very similar to this one, although not so large. All of the yards are provided with switch tracks, except the Forty-ninth street yard, which soon will be, and each one is equipped with derricks for handling pipe and special castings. All material for the use of the pipe-laying gangs is carried in stock at these yards. Material is delivered to the district foreman on receipt of a requisition signed by him and describing the material wanted. This requisition must bear the job number, and will not be filled unless it does. With this job number before him

Job No. ....

3rd District.
Bureau of Engineering,
Water Pipe Extension.
H. L. Lucas, Supt.

Chicago.....190...

To Superintendent of Pipe Yards:
Please furnish the following materials:

Quantity	Description	Amount	Delivered	Remarks

Signed.....
District Foreman

the yard foreman, who has received a copy of the original order, looks up in his card index the record of work to be done and material to be furnished under that order number, and if found to be correct the requisition is filled. A delivery receipt is then made out in duplicate and, after being signed, the original is given to the district teamster. These receipts are numbered consecutively for each district, so that the district stock-

Division of Water Pipe Extension, Bureau of Engineering
DELIVERY RECEIPT

Requisition No.....
Received of.....Date.....190...

District Foreman.....

Teamster..... Per.....

keeper can readily tell if he misses a receipt and can get a copy, thus making it easy to keep a correct account of material received. When a district sends in tools or material to the pipe yards, it fills out a blank form in duplicate, giving a list of the articles, and sends both copies to the yard, receiving the original back after it has been receipted by the yard foreman.

Receipts and deliveries are recorded on a daily report sheet by each pipe yard foreman, and forwarded

DAILY REPORT

Chicago.....190 .

Material Received and Delivered at.....Pipe Yard.

From Whom Received.	Amount.	Kind of Material.

Req. No.	To Whom Delivered.	Amount.	Kind of Material.

.....Foreman.

to the office of the Superintendent of pipe yards, where they are posted in a ledger, which carries an account for each yard and each district. At the end of each month a balance sheet is drawn off for the pipe yards, showing receipts and deliveries during the month and stock on hand at end of the month. (See page 1002.)

When the district men have tools in need of repairs or sharpening, they send them to the yard and get good tools in exchange. These old tools are then sent to the water works shop, which is under the management of the Water Works Shops and Repair Division, and an

order is made out for the work to be done. All valves and fire hydrants used by the division are also made by the water works shops, and ordered in the same way as is any other machine work required.

P. W. H. 137-5M-12-1908

BUREAU OF ENGINEERING
WATER PIPE EXTENSION

DIST. NO._____ ORDER NO._____
SHOP ORDER NO._____
CHICAGO,_____

TO SUPT. OF WATER WORKS SHOPS.
DEAR SIR:—
PLEASE DELIVER THE FOLLOWING MATERIAL TO THE PIPE YARD:

AMOUNT	MATERIAL

YOURS TRULY,

ORIGINAL—KEEP THIS. SUPT. PIPE YARDS.

P. W. H. 138. 5M. 11-1908

ORDER BILL
DEPARTMENT OF PUBLIC WORKS
CHICAGO
Bureau of Engineering—Water Pipe Extension
ORDER FOR TOOLS AND MATERIAL

No._____ Date_____ 190

Deliver at_____

Remarks_____

TOOLS		MATERIAL			
No.	Description	No.	Size	Description	Weight
				Pipe	
				"	
				Crosses	
				"	
				Tees	
				"	
				Reducers	
				Bends	
				Sleeves	
				"	
				Plugs	
				Caps	
				Lead	
				Yarn	
				Coal	
				Lumber	
				Valves	
				Hydrants	
				Brick	
				Cement	
				Sand	
				Sewer Pipe	

In Charge of Gang

Each district foreman has a stockkeeper at his district office, who keeps a record of all material received or sent out to the assistant foremen on the jobs. When an assistant foreman needs tools or material he sends in an order for the material required. When the stockkeeper has filled the order he makes out a delivery bill in duplicate, retaining one with the signature of the teamster, and sending the other with the material to the assistant foreman. This is practically the same form as the order blank.

Scrap iron or material left over when a job is completed is sent into the district yard, accompanied by a record of same, which is receipted for by the stockkeeper. When an assistant foreman sends in scrap iron he is instructed to fill out a postal card and send same to the superintendent of pipe yards, showing approximate amount of scrap iron sent in.

JOB NO.....

Chicago.....190 .

Foreman.....District

I send herewith the following picked up materials:

.....

.....

Remarks .....

.....

Location .....

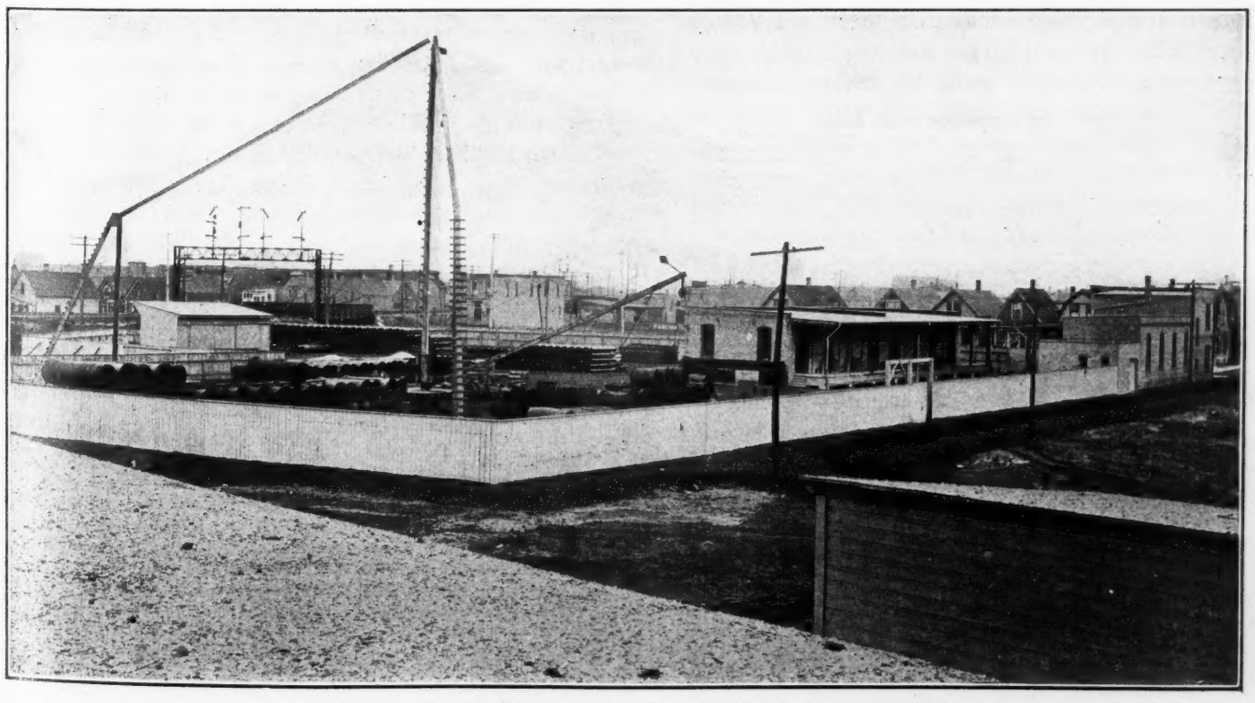
.....

Teamster In charge of gang.

This system of orders and receipts has been instrumental in greatly reducing the amount of tools lost, and enables the district foremen and assistant superintendent to place the responsibility for material or tools unaccounted for.

With the above system of records, it is possible for the Superintendent of pipe yards to strike a balance any time, and easily ascertain the amount of tools and material on hand at any yard or in any district.

This system was inaugurated on June 22, 1908, at which time orders were issued to yardmen and foremen by the superintendent giving them definite instructions as to how to use the forms provided. A man is sent out from the office on the first of January and the first of July to take an inventory of all tools and material on hand at all district-yards and pipe yards. A report of the stock on hand, that received and that delivered, and the balance at the end of the month are entered on a form of which a portion is shown on the next page.



PIPE YARD A, CORNER AVERS AVENUE AND WABANSIA AVENUE

DEPARTMENT OF PUBLIC WORKS.
WATER PIPE EXTENSION.

STOCK REPORT OF THE PIPE YARD FOR THE MONTH OF 190

	Water Pipe 4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	42"	48"	Manhole Pipe 24"	30"	36"	48"
On hand per last report.																		
Received during Month.																		
Delivered during Month.																		
Balance on hand.																		

	Tees 4x4	6x4	6x6	8x4	8x6	8x8	10x6	10x8	12x4	12x6	12x8	12x12	14x4	14x6	16x6	16x8	16x12	16x16	24x6	24x8	24x10	24x12	24x16	24x24	30x6
On hand per last report.																									
Received during Month.																									
Delivered during Month.																									
Balance on hand.																									

	Crosses 4x4x4	6x4x4	6x6x6	8x4x4	8x6x6	8x8x8	10x8x8	12x8x8	12x4x4	16x12x12	16x16x16	24x6x4	24x6x6	24x8x8	30x12x12	30x16x16	30x24x24	Blow Offs
On hand per last report.																		
Received during Month.																		
Delivered during Month.																		
Balance on hand.																		

	Sleeves 4"	4" Split	6"	6" Split	8"	8" Split	10"	10" Split	12"	12" Split	14"	14" Split	16"	16" Split	16" Split Bell	18"	20"	20" Split	24"	24" Split	24" Split Bell	30"	30" Split	36"	36" Split	36" Split Bell	48"
On hand per last report.																											
Received during Month.																											
Delivered during Month.																											
Balance on hand.																											

	Circle Bends 4"	4"	6"	6"	8"	8"	10"	12"	12"	16"	16"	16"	16"	20"	20"	24"	24"
On hand per last report.																	
Received during Month.																	
Delivered during Month.																	
Balance on hand.																	

	Y Branches 6x6	8x6	8x8	10x6	12x6	12x8	12x12	16x6	16x8	16x12	16x16	24x6	24x8	24x12	Reducers 6 to 4	8 to 4	8 to 6	12 to 10	16 to 8	16 to 12	16 to 14	18 to 16	20 to 12
On hand per last report.																							
Received during Month.																							
Delivered during Month.																							
Balance on hand.																							

PART OF FORM OF STOCK BALANCE SHEET

Another important feature of the work has been the testing and repairing of gate valves.

Formerly it was thought sufficient to test the large valves by operating these for a few turns only, and oiling them. By this method there could be no certainty that the valves would close when wanted or that any section of main could be entirely shut off in case of a break occurring. In the fall of 1907 a valve gang was organized and placed in charge of Mr. J. L. Atherton, Assistant Engineer, who was instructed to shut down each section just long enough to test a fire hydrant and show that it was dead. An accurate record was kept on a printed form of all the valve operations, showing

WATER PIPE EXTENSION VALVE GANG.
VALVES OPERATED.
DATE ________ No. 1000

No.	Size	Make	No. of Turns	Location	Time Closed	Time Opened	X	Remarks and Condition
1								
2								
9								

NOTE.—VALVES MARKED X ARE NEEDED TO SHUT DOWN SECTION NO. ______

______ In Charge of Work.

the time of operating, number of turns, location, etc., of each valve; also a description of the main shutdown was entered on another blank. These notes were all

WATER PIPE EXTENSION VALVE GANG
RECORD OF SHUT DOWN — SECTION No. 1850

Size of Main	On	From	To	Valves Required: Valve No.	Sheet No.
Description and Location of Hydrants					

made in the field, and after being checked against the atlas, were filed in a card file for future reference.

Almost all the large pipe in the city, sixteen inches in diameter and above, have been worked over by this gang, and a portion of the small pipes also have been tried out. A great deal of care and good judgment must be used in shutting down mains and sections thereof, so as not to interfere with the supply to any consumer. This is possible in Chicago because the system is all interconnected, and if care is taken one feeder main can be shut off for a short time without crippling the system. During the progress of this work no serious trouble has been experienced on account of shutting off any main. It has been necessary, however, on some mains to do this work at night or on Sunday to avoid trouble.

As a result of this work an accurate record was obtained of valves and connections and corrections (if needed) made on the plats; information was gained as to existing connections between mains; valves that would not operate readily or were out of order were repaired; valves were located that did not show on maps before, and in many other ways has the value of this work been felt.

Another feature of interest is the testing of the newly completed mains by hydraulic pressure. This work is done by means of a testing outfit consisting of a two-horsepower gasoline engine and a small Gould triplex pump, mounted on a light covered truck. The new main is capped or shut off and then filled with water. The test pump is then connected to a hydrant on the new main or, if none is available, to a tap set in the main, and the pressure raised to one hundred pounds to the square inch and held there for a short time. If any leaks show up, they can be repaired at almost no expense to the contractor, and the city is insured a tight pipe line.

The testing work was started in order to get a test on the pipe lines laid by contract, but on account of its value it has been the practice to test the work done by the city gangs also. A significant fact is that at first it was common to find from two to four leaks on a job when the pressure was applied, while at present it is not often that a leak is found.

SINKING FUND FOR WATER DEPARTMENT

Water Works Superintendent Charles A. Bogardus, of Chicopee, Mass., in his latest annual report illustrates the desirability of the establishing of a sinking fund by every Water Works Department or company. He says:

> It seems proper at this point for us to say again that the establishment of a sinking fund in the Water Department would work out to the best good of the entire city. We have shown that new boilers, or possibly an electric motor pump, may be needed. It is growing daily more evident that the land on the watershed of Cooley Brook should be owned by the city. A sinking fund would be of value in connection with these needs, and if the fund had been established at the start we could have avoided asking the State for a bond issue of $28,000 to take care of the water supply in Fairview.

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Readers are invited to contribute to the MUNICIPAL JOURNAL AND ENGINEER, either in the form of special articles or of letters discussing matters of current interest.

It is also desired that the facilities furnished by the reference library in this office should be widely known and freely used by those interested in municipal affairs. Visitors will be welcomed and provided with conveniences for search, and inquiries by mail will be promptly dealt with.

JUNE 2, 1909.

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Water Works Management

WHEN supplying water to a community meant only the construction of an impounding reservoir and a pipe line, and the maintenance was confined to making service connections and collecting a few score of bills quarterly, as was quite common along the Atlantic coast some years ago, the business of a water works department was not complicated nor demanding of unusual ability. But during the past few years this condition has changed quite generally and materially. More general use by manufactories and more lavish residence plumbing have occasioned increase in consumption which, especially when combined with limitations of quantity of supply, have made necessary some attention to quantity of consumption. Quality, also, is demanding increasing consideration as our streams become more polluted and the standards of popular opinion and information are raised; and improving quality involves complications of maintenance, both physical and financial. Add to this the increased amount of pumping made necessary by demands for more abundant supplies, and for new plants in cities not favored by topography with gravity supplies, and also the healthy growth in the amount of service rendered in the larger cities, and we have a condition which demands a high order of executive ability and business management for its proper conduct.

Too many plants are not meeting this demand, even among the private ones. But it is in municipal plants where loose and unbusinesslike methods are most likely to be permitted; and whose managers, in consequence, deserve the most praise when they place their departments on a business basis. In general business management means a strict accounting for all material purchased or received and for all which leaves the plant. How much coal was received, and of what heat value and how many foot-pounds of work it did; how much labor was employed, and how it was distributed among the various classes of the department's work; how much water was pumped (with actual knowledge of the slip to be allowed for) and where all of it went; how efficient the filters were and the cost per million gallons of securing such results, and how much was received for each class of service and whether it was rendered at a profit or loss; these are some of the data which should be *known,* not estimated. How much does providing fire protection cost, over and above what a domestic service only would demand? Under what conditions, if any, do meters cost more than the service they render is worth? These and other questions are forcing themselves upon the attention of business managers.

We believe that the American Water Works Association, which meets in Milwaukee next week and which has done so much for the best development of water works interests, could do no better service at this time than discussing this subject of the management of water works on a strictly business basis. Boiler room practice, purification methods, etc., are all essentials to this, but even more important is the co-ordinating of all these to economic management.

EASTON'S RESERVOIR AND POWER PUMPS

Making a Tight Reservoir in Mixed Earth and Seamy Rock—Gas, Gasoline and Electricity Employed for Pumping—Service Efficiency

As in many other cities, the water works plant at Easton, Pa., was a gradual growth from a small beginning, and the time arrived a few years ago when it became necessary to make considerable changes in order to provide for increased consumption. The pumping plant and reservoir were on the north side of Bushkill Creek, while by far the largest part of the population lay on the south side; and one 20-inch line connected the two sides. This line was carried along the side of a steep hill, and a leak in it might have caused a washout which would have rendered its repair difficult and a matter possibly of days, during which practically the entire city would have been deprived of water. Moreover, the part of the city furthest from the reservoir lies on a hill which is but little lower than the reservoir, and the pressure in the mains at this point became very small at times of heavy draft. To meet these conditions it was decided to construct an additional line connecting the existing reservoir with the high portion of the city, this line passing through the business center and crossing the creek at some distance from the existing crossing, so as to render the supply more certain and the fire protection in the center of the town more satisfactory.

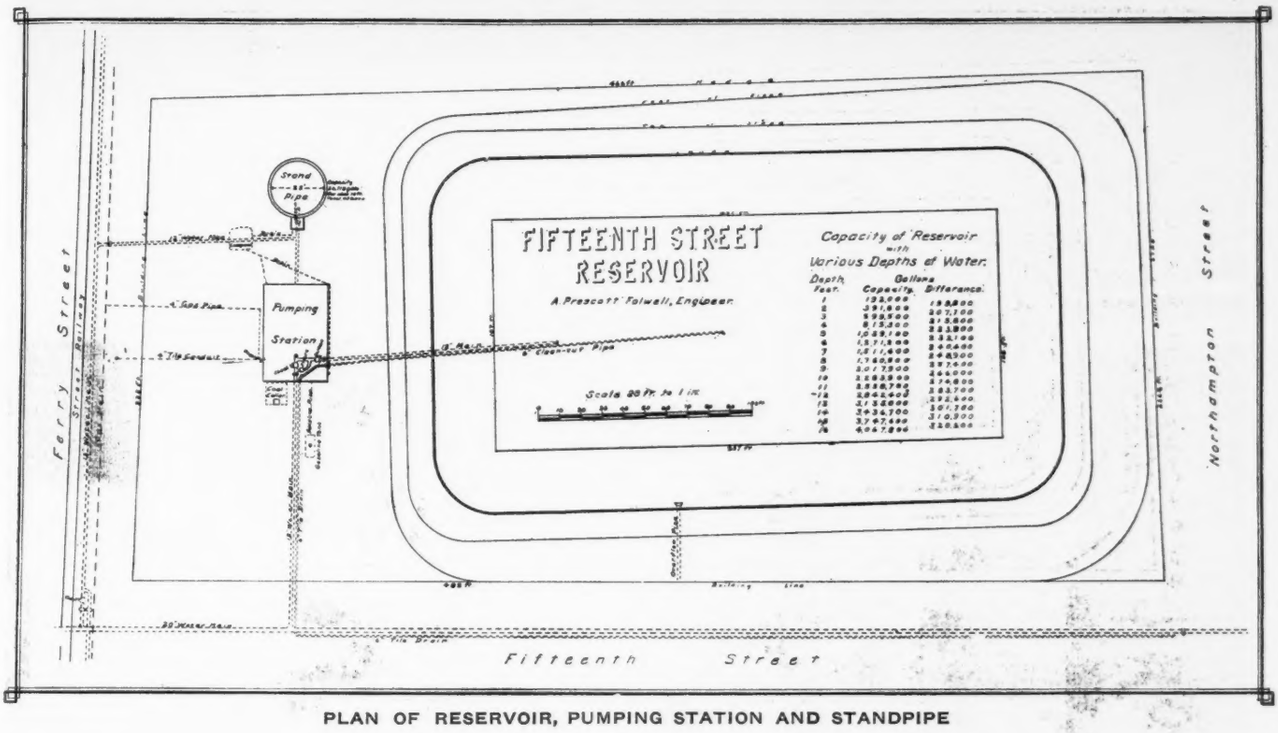
Even this, however, would not afford sufficient head in the extreme western part of the city and it was decided to install there a pumping station and standpipe. In addition to these, a reservoir was constructed alongside of the pumping station which served the double purpose of supplying water to the pumps and of affording an additional reserve for the low service. With these two reservoirs on opposite sides of the city, each connected by a large main to the business section, this section has a fire protection which no single accident could seriously affect. The high service pumping plant consists of two power pumps, either of which can be driven by either electricity, gas or gasoline.

RESERVOIR BOTTOM, SHOWING IRREGULAR ROCK SURFACE

On the site of the proposed reservoir there had been built about 50 years ago a smaller reservoir which was used for a time during the earlier history of the water company; but in spite of numerous attempts to make it tight by use of clay puddle, it had never been possible to obtain a greater depth of water than 5 feet, and it had been abandoned years before. Test pits showed that limestone rock underlaid the site of the reservoir, coming practically to the surface at the south end and falling to an elevation about 10 feet lower near the north end, where occurred a fault of unknown depth and having a width of at least 50 feet, and possibly more; this fault being filled with clayey earth. When stripped of the clay which had been used as puddle, the rock beneath, as well as that outside of the old reservoir, was found to be very uneven on the surface, the pitch of the rock making an angle of about 30 degrees with the horizontal. The engineer's previous experience with similar conditions led him to believe that the only method of making water-tight a seamy limestone rock such as this was by the generous use of concrete; and had the entire reservoir been in rock the problem would not have appeared difficult. The difficulty arose from the presence in the bottom of the fault above mentioned, and because the north bank was entirely of earth, the south bank about two-thirds rock and one-third earth, and the east and west banks varied gradually from one-third to all earth.

To meet the difficulty presented by the fault in the bottom, a concrete arch of about 30 feet span was thrown across a part of the fault, the south end of the arch resting upon rock and the north upon soil at a point nearly under the center of the north embankment. It was realized that the resting of one end of the arch against earth was taking a risk, but to have reached rock for this would have required the removing of the entire north bank of the old reservoir (which was being utilized for the new reservoir), and would have necessitated an arch of probably 100 foot span. The arch extended entirely across the north end of the reservoir to the center of the east and west embankments, and the toe of the north embankment came almost exactly at its crown. In constructing the arch a channel was left along the line of the toe of all three embankments, which was used for keying the concrete lining of the embankments into the arch; reliance being placed upon the water-tightness of such construction to prevent the softening of the earth at the springing line of the concrete arch.

At the sides and south end the concrete lining was carried up as high as the rock extended, being given a minimum thickness of 4 inches (the unavoidable irregularities made in excavating the rock caused the average thickness to be about 8 inches); this being done before any embankment was made. The embankment was then constructed on top of the rock and carried up as nearly vertical as possible from the face of the concrete lining until it reached a plane 12 inches outside of the plane of the finished lining; this being done because of the impossibility of thoroughly compacting the outer foot or 18 inches of an embankment. After the completion of the embankment 18 inches of this was cut



PLAN OF RESERVOIR, PUMPING STATION AND STANDPIPE

off and the embankment trimmed to a surface 6 inches back of the finished surface, to allow for a 6-inch concrete lining; the cut for three feet immediately above the rock increasing from 6 inches at the top to 12 inches at the rock surface, to insure a bonding of the concrete with the rock.

The embankment was made with greatest possible care to obtain thorough compacting, being laid in thin layers and rolled thoroughly with a grooved roller; each layer being well sprinkled immediately before the next was applied. The result is that no evidence of any settlement whatever has occurred at any point. It was made wider than the finished bank by 18 inches on each side, which amount was cut off in dressing the bank.

In concreting the bottom, a number of faults and pockets were found, and these and all irregularities were made absolutely clean of all earth and loose stone, being scoured by a jet of water just before the placing of the concrete. Where a pocket seemed to extend to a considerable depth it was excavated to a depth below the finished surface equal to one-half its width and the concrete then applied, serving as a flat arch over the opening.

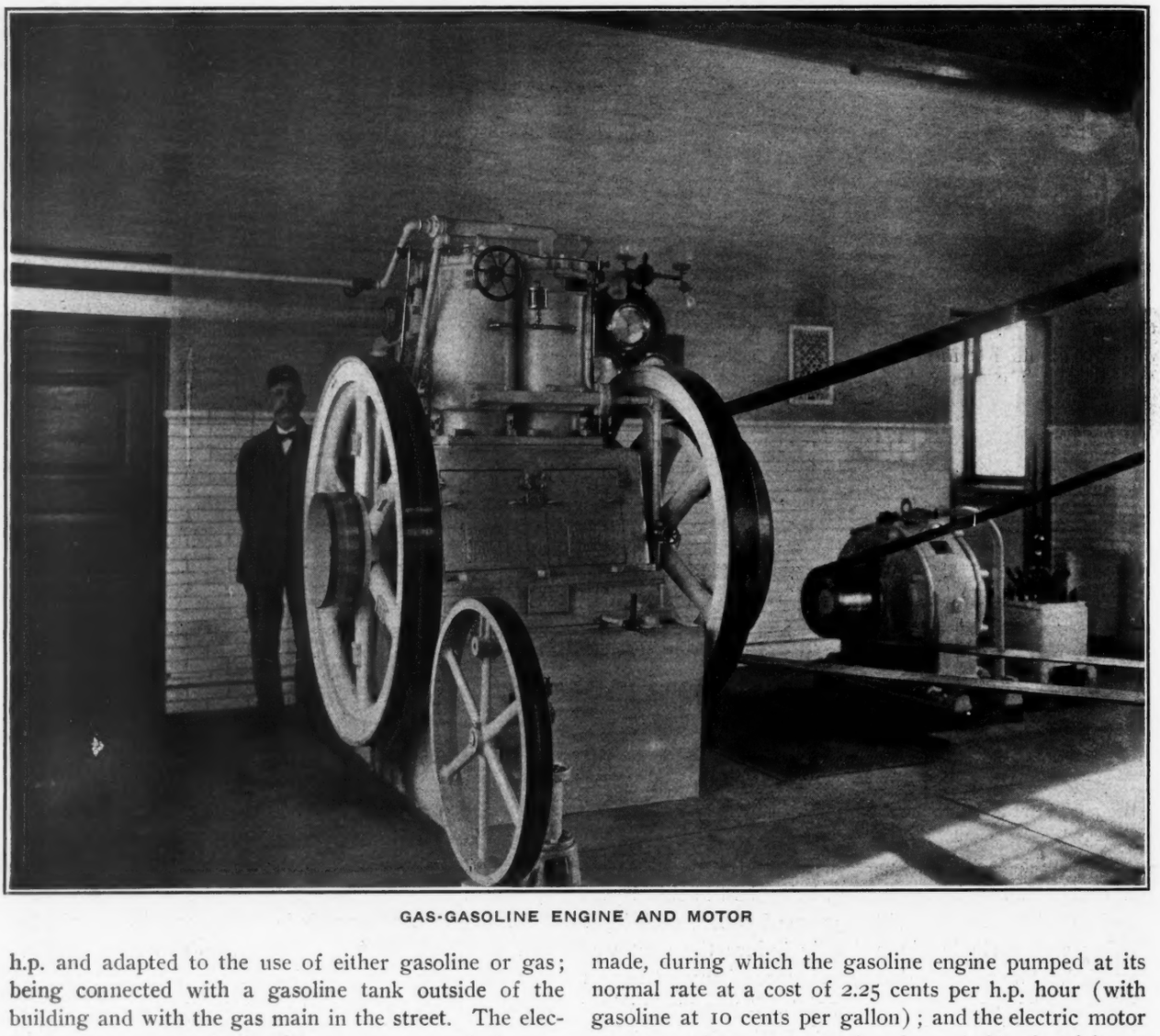
At the point where the intake and outtake pipes pass through the embankment the cut through the rock resulted in a considerable shattering of the same. Before refilling this cut, all loose pieces of rock, or any which appeared to have at all moved from their position were removed, and the whole was then filled with concrete, rich concrete being placed by hand at all points where it seemed possible that it would not flow by gravity. This concrete was made a monolith from the bottom to the level of the top of the rock, being all placed at one operation and as wet as it could be made to stand at a slope of 1½ to 1.

After the concrete lining had been completed it was thoroughly washed with a neat cement grout of the consistency of thick whitewash, put on with a whitewash brush; this being followed two or three days later by another similar wash. The embankments were then covered with a 4-inch layer of brick, the idea of which was to protect the surface from any accident which would break this water-proof coating, and also to reduce the effect of temperature changes at points not covered by water.

Although this reservoir is 237 by 107 feet on the bottom and holds 16 feet of water, no provision whatever was made for expansion joints, but particular care was taken to bond the work of succeeding days by rich cement mortar. Although careful inspection was made of the concrete up to the time of filling the reservoir no cracks were found at any point other than hair cracks into which the point of a knife even could not be inserted. The reservoir has now been in service about four years and has from the first been absolutely tight with one exception. When the water rises to within a few feet of its highest elevation there is found, in cold winter weather only, a small amount of leakage which does no damage and is not of sufficient importance to warrant any great expense at discovering its location and correcting it. Casual inspection fails to show where this is, but it is believed to be caused by the slight opening of a joint between the concrete lining and the top of the rock at the southern end, this being caused by the contraction due to low temperature.

Pumping Plant

The pumps consist of two 3-cylinder plunger pumps manufactured by the Goulds Manufacturing Company. Each pump has a capacity of one million gallons in 24 hours when making 40 revolutions a minute. These pumps are driven by belt and three sources of power are provided—electricity, gasoline and gas. The electric motor is a 30-h.p. Westinghouse motor, alternating current. A Nash engine was provided of about the same



GAS-GASOLINE ENGINE AND MOTOR

h.p. and adapted to the use of either gasoline or gas; being connected with a gasoline tank outside of the building and with the gas main in the street. The electric motor is connected with one pump and the gas engine with the other; but by coupling the shafts of the two pumps together and manipulating the friction clutches, the wheel of one pump can be made to drive the other pump in an emergency, and thus the pumps and engines be cross-connected. These pumps raise water into a standpipe 120 feet high and 25 feet in diameter, located about 25 feet from the pumping station. The station was designed by an architect especially for this location, with particular regard to its artistic features. The outer walls are of buff brick and the roof of red tile. The inside walls are of brick above with a white tile wainscoting about 5 feet high around the entire engine room. The floor of the engine room is of concrete and the engines and pumps are painted with white enamel. This makes necessary the greatest cleanliness about the station, and after four years of operation few oil stains can be seen upon the machinery. The grounds are well kept, and the general effect of these, the pumping station and reservoir embankment so far offset that of the standpipe that the value of property in the vicinity rose greatly immediately after their completion.

Upon the completion of the plant a 24-hour test was made, during which the gasoline engine pumped at its normal rate at a cost of 2.25 cents per h.p. hour (with gasoline at 10 cents per gallon); and the electric motor at a cost of 5.5 cents per h.p. hour (with electricity at 5.5 cents per kw. hour). These are the expenses for gasoline and current only.

The high service area is not yet heavily populated and it is not necessary to run the pumps more than an average of an hour or two a day. Their operation is very simple and is attended to by the street foreman, who, by pumping two or three days in the week for a few hours at a time keeps the standpipe sufficiently full. During the four years the plant has been in operation the pump has been repacked once, but no repairs have been made upon either pumps, motor or gas engine, and no expense whatever has been incurred aside from that for current, gas and gasoline, oil, etc., except the purchase of a set of jars in connection with the sparking appliance of the gas engine.

During 1908 the gasoline engine was operated a total of 140 hours and 30 minutes, during which time it pumped 5,527,255 gallons; using 550 gallons of gasoline which, at 11½ cents, cost $63.25, or 1.14 cents per thousand gallons. The average head pumped against was about 100 feet. The gas engine during that year operated 23 hours and 15 minutes, raising 1,039,174 gallons and using 17,300 cubic feet of gas at $1 per

thousand, or a total cost of $17.30, or about 1.66 cents per thousand gallons. Electricity was used for 151 hours and raised 6,297,164 gallons, the amount of current used amounting to 2,626,800 kw.-hours which, at 5¾ cents and 10 per cent discount, amounted to $135.94, or 2.16 cents per thousand gallons. The average head of 100 feet given above is approximate only; but assuming it to be correct, and using the same prices as at the test, for the sake of comparison, the service cost of gasoline pumping in 1908 was 2.36 cents per h.p. hour, and that of electric pumping, 5.46. These show remarkably close agreement with the test, and illustrate the economy of such plants for intermittent service. It can hardly be questioned that the cost of this service by a steam plant would have been considerably more than either of the above.

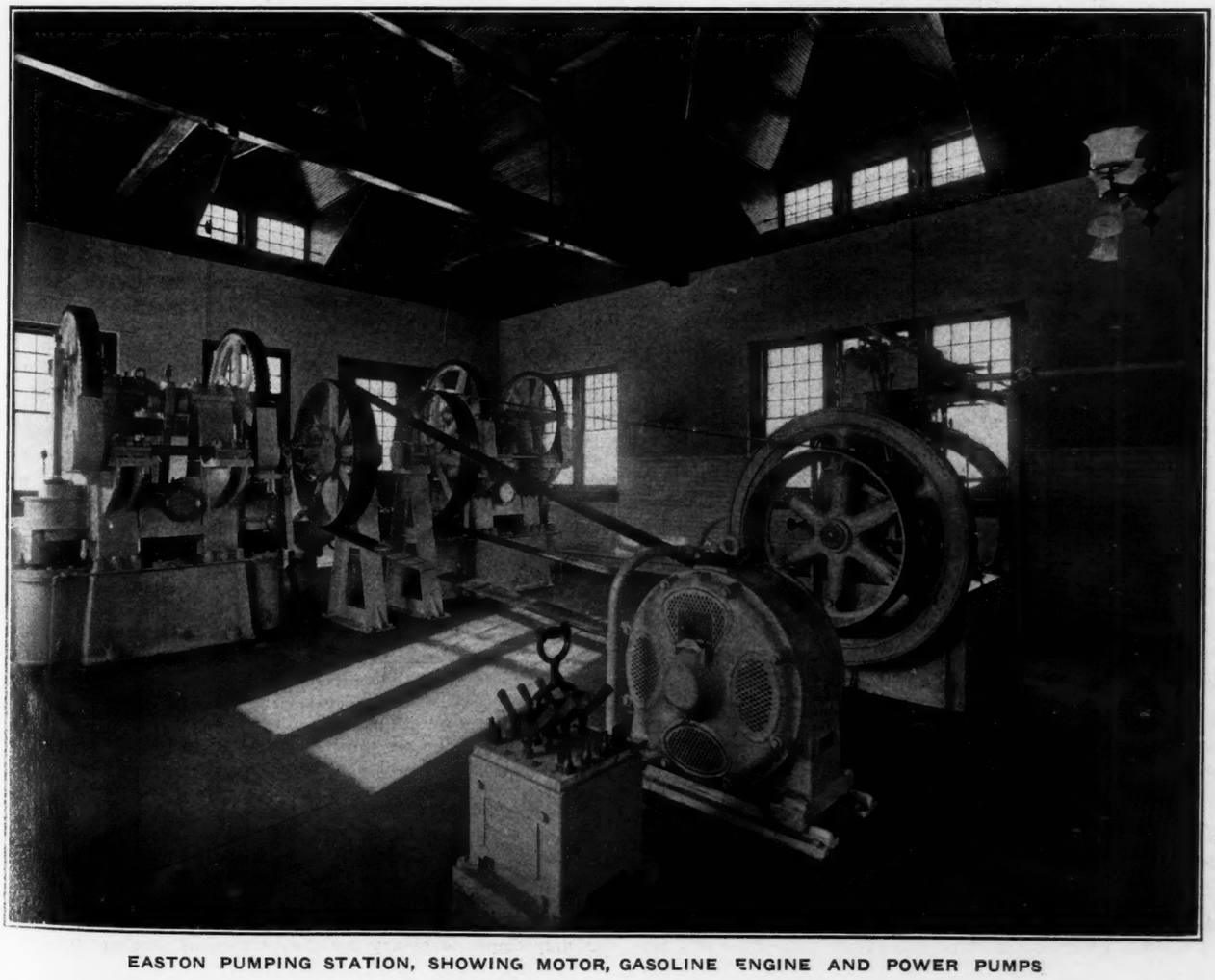
The cost of the pumping plant and piping was $7,100 and that of the pumping station $5,886. The cost of the reservoir was $29,200, of which $2,600 was for leveling off the rock bottom and $7,000 for the concrete described above aside from the lining; that is, about one-third of the payment was for making the faulty bottom tight.

Mr. J. S. Rodenbough was president of the Lehigh Water Company, the owners of this plant, and Mr. R. P. Rader was superintendent. A. Prescott Folwell was designing and constructing engineer.

UPWARD FILTRATION OF WATER

THERE is now in operation at Niagara Falls, N. Y., a small water filtration plant used as a demonstration plant, although on a considerable scale, which involves some principles differing from the majority of similar plants; the chief of these being that the water passes upward through the filtering material rather than downward. A plant practically the same in all particulars has been operated for two years past at Jerome Park, New York, where the City of New York and a few private companies have been carrying on experiments in water purification.

Each of these-plants consist of a bed 19 feet 6 inches by 14 feet 3 inches. The materials composing this are contained within a tank of reinforced concrete which is 6 feet deep, the walls being 4 inches thick. The bottom is not solid, but is composed of a series of wooden slats of ⅞-inch stuff set at an angle of 45 degrees with the vertical and spaced ⅞ of an inch apart, covering the entire bottom and resting upon the edges of the tank and two intermediate beams. Upon these slats is laid heavy galvanized iron netting of No. 8 mesh. On this is spread a 7-inch layer of screened charcoal about one-fourth to three-fourths of an inch diameter. Over this is placed copper wire netting of No. 30 mesh and upon this again is a layer of sand 20 inches deep. The sand is fairly coarse sand from

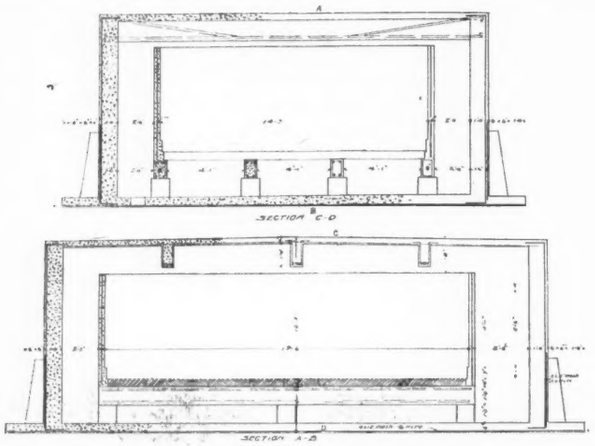


EASTON PUMPING STATION, SHOWING MOTOR, GASOLINE ENGINE AND POWER PUMPS

Red Wing, Minn., and the copper netting is of sufficiently fine mesh to prevent it from passing through into the charcoal.

The whole tank containing the filtering material rests upon four 8 x 12 concrete beams reinforced with one-inch rods, which in turn are supported at the ends by concrete piers 12 inches high. Surrounding this tank and at a distance of two feet from its outside surface is another water-tight concrete tank; the bottom of which is two feet beneath the bottom of the slats or two feet four inches beneath the charcoal.

In operation the raw water enters the outside tank in which it stands a few inches higher than in the inner tank; which head is sufficient to force it upward through the charcoal and sand. A few inches above



the surface of the sand is an overflow which removes the effluent. The head ordinarily required is about 6 or 8 inches, although at times this may be allowed to increase to 12 inches or possibly more. The head is maintained constant by a ball cock regulator in the outer tank.

Considerable sedimentation takes place in the outer tank. A clean-out pipe is provided in the bottom of this for flushing it out. In cleaning the filter the current is reversed and the wash water discharged through this clean-out pipe.

The filters are being operated at the rate of about 15,000,000 gallons per day, and are said to effect a reduction of bacteria of about 99.2 per cent in Croton water and 99.6 per cent at Niagara Falls. According to Mr. John C. Sparks, who has directed the operation, the raw water at Niagara Falls contained from six to fourteen thousand bacteria per cc., of which three to six thousand were acid-producing, which were reduced to 85 per cc., with no acid-forming colonies when the filter was in good condition, and the 250 colonies per cc., on an average, in Croton water were reduced to an average of 3.

It is claimed that the charcoal removes the color of the water and also contributes oxygen to the same for several months, the latter being assisted by galvanic action between the two screens, a difference of potential of 0.8 volt between them having been measured. The system is controlled by the Municipal Filtration Company, of New York.

WATER FRANCHISE OF ELKHART

Use Covered by Hydrant Rental—Rates Specified—Metering—Enlargement of Equipment—Pressure Guaranteed—Option of Purchase

The Municipal Journal and Engineer from time to time receives requests for forms of franchises to be granted to various public service corporations which they can recommend as being fair to city, consumer and company. We give herewith the principal sections of a contract entered into between the city of Elkhart, Ind., and the Elkhart Water Company as approximately meeting this description so far as water works franchises are concerned. There are some points which it seems to us might be improved upon, but it is possible that local conditions of which we are ignorant justify them. In fact, probably no one franchise could be formulated which would exactly meet the requirements of all localities, since each will be influenced by certain local conditions, either legal or material, which must have their effect upon any proper franchise.

The city of Elkhart advertised for sealed bids for supplying water for a term of 25 years, to be submitted on February 17; and the Elkhart Water Company, which has heretofore been performing that service, was, we believe, the only bidder. The Board of Public Works accepted their proposition on March 1, but to make this operative it was necessary for the Council to accept it at three regular meetings; and this was done at the meetings of March 3, March 17 and April 7. This franchise took effect on the 29th of April and contains the agreement of the water company—

That for a period of 25 years from and after April 29, 1909, it will furnish water for fire protection in accordance with, and upon the terms and conditions hereinafter specified, charging $40 per hydrant per annum for the number of hydrants in use by the city on said April 29, 1909, viz., 284.

That it will from time to time during the said 25 years extend its mains as the growth and development of the city may require; such extensions to be promptly made upon the request and order of the city; provided, that upon such extensions there shall be placed one modern and efficient fire hydrant for each 500 lineal feet of extension so made, and for which the city shall pay the company as rental therefor the sum of $40 per annum for each hydrant, from the time of placing the same until the expiration of this contract.

That in consideration of the payment of the said hydrant rentals, the city shall have the right, during said period, to use from the company's mains all water necessary for city purposes without charge. Provided, that the city shall use only such water as may be necessary for cleaning and flushing sewers, gutters and streets through a 2½-inch hose from any two hydrants at any time, except during the hours set apart for sprinkling and during the time of a fire or a test. Provided further, that water for fountains in public parks shall not be used to exceed 10 hours per day, and the orifice in said fountains shall not exceed ¼ inch, and that all water used for city purposes shall be used economically and not wasted. And provided further, that the company shall not be required to lay mains to furnish the city with such water, but all pipes, plumbing and fixtures required to convey such water from the company's mains to the point where the water is desired to be used shall be furnished and paid for by the city.

That the city shall have the privilege of placing upon any mains now laid, at its expense, such additional hydrants as it may deem necessary for fire protection purposes, and it

shall not thereafter be chargeable for any additional rental for the same. Provided, in consideration of such freedom from charge that such hydrants when so placed and the pipe connecting the same shall become the company's property and a part of its system.

That the company will constantly keep all fire hydrants rented of it by the city supplied with water for efficient fire service, and shall maintain them in effective working order. The Chief of the Fire Department of the said city, or, in his absence, the officers in charge thereof, shall have the charge and control of said fire hydrants, and may at any time cause said hydrants to be inspected; and if upon inspection any of said hydrants are found to be out of working order he shall forthwith notify the company in writing, specifying the hydrant or hydrants out of working order, and shall also report to the Board of Public Works the date of such examination, and the result thereof, and his subsequent action in the premises, and in case any hydrant shall be found out of working order the company shall forthwith repair the same, or the city shall be entitled to deduct from said hydrant rental the sum of $20 per week for the time said hydrant shall remain out of repair. The company will not suffer a suspension of the supply of water unless the same shall be caused by accident or causes beyond its control, and in case of accident or other causes the company will forthwith proceed with all possible diligence to repair and put the same in successful operation, and if it suspends operations or fails to make such repairs as herein required, then the rights and privileges granted it shall be forfeited.

All hydrant rentals specified herein to be paid by the city to the company semi-annually on the first day of May and November of each year at the City Treasurer's office.

That the company will furnish water as aforesaid to the inhabitants of the city located on its line of mains, during said period of 25 years, for the following prices, terms and conditions, viz.:

About two octavo pages are devoted to the water rates, given in great detail, these being classified as those for stores, factories, etc.; for residences, and combination residence rates; also meter rates for each class. The meter rates for all classes are 12 cents per thousand gallons for the first 80,000 gallons consumed during one month, 10 cents per thousand gallons for the next 80,000, and 8 cents per thousand gallons for all over 160,000 gallons consumed during the month. The minimum charge for water furnished through a meter for stores, factories, etc., is $1 a month, and the minimum for residences is 75 cents a month. The charge for sprinkling a yard and street from May 1 to November 1 is $4 for a frontage of 42 feet or less, 8 cents for each additional foot and 1 cent for the side frontage of a corner lot; also 2 cents per foot in addition for using a mechanical sprinkling device. Yard sprinkling, where water is not supplied through meters, is permitted only between 5 and 8 o'clock in the morning and 5 and 8 o'clock in the evening; all sprinkling to cease in case of an alarm of fire.

Any domestic consumer upon whose service pipe there is or will be a ⅝ or ¾-inch meter placed shall have the privilege of paying in advance a $10 annual charge, and for such sum he shall be entitled to consume 80,000 gallons of water during the ensuing year, all water consumed and passing through such meter during said year in excess of said 80,000 gallons shall be paid for in addition to said annual charge at the rate of 12 cents per 1,000 gallons. Any such water consumer who will pay the said sum of $10 per annum in advance may require the company to place such a meter on his service pipes. Provided, that the consumer so requiring a meter shall arrange his service pipes in such manner that such meter can be placed upon such pipes in a practical manner and without unusual expense. The meters thus requested shall be placed in the order in which the requests therefor are received by the company, and as soon thereafter as practicable.

The company to have the right to fix and charge a reasonable rate for any other service not herein specified.

The company to have the right to place a meter on the service pipes of any consumer at any time at its expense, and collect the meter charges and rates as herein specified. All specific schedule rates shall be payable quarterly in advance.

Where the only service that a consumer has is lawn sprinkling the charge shall be paid for the season in advance.

The plant and equipment that shall be used to furnish such supply of water shall be the present plant and equipment of the company, supplemented, enlarged and extended as hereinafter specified. The plant and its equipment shall be made capable of supplying, at an efficient pressure, the city and its inhabitants with at least 6,000,000 gallons of such water continuously per day. And its system shall be maintained continuously during said period of 25 years, so that it shall be capable at all times of furnishing the city and its inhabitants with an ample supply of such water.

The company will make the following additions, extensions and improvements to its said plant within the times hereafter specified, viz.:

Sink another well on its land, of like or larger diameter than the wells it now has, and connect such well with its present wells.

Install three improved water tube boilers of at least 200 horsepower each to operate its pumps.

Install in the place of two of its small pumps one modern pumping engine with a classed pumping capacity of 6,000,000 gallons per day, and supply it with all necessary appliances and attachments.

The company will enlarge, extend and change the following mains on or before August 1, 1910, viz.:

Here is given a list of 25 streets upon which extensions will be laid before August 1, 1910; 17 other streets upon which extensions will be made within the succeeding year, and 16 additional streets upon which extensions will be laid before August 1, 1912.

Following this is stated the source from which the supply will be obtained (in this case driven wells), and providing that, should this become inadequate, the city and company shall agree upon a source for additional supply.

The method and manner of distribution shall be by direct pressure upon the mains of the company, by means of modern pumping engines at its pumping station. The water shall be forced into and supplied at an efficient pressure from standard iron water mains as now laid in the public streets, or as may hereafter be laid in such streets.

The company, except when prevented by unavoidable accident or other causes beyond its control, shall constantly maintain in such mains a pressure of not less than 50 pounds per square inch; such pressure to be tested, evidenced and recorded by a good and accurate recording gauge, which the city shall procure, keep and maintain at its City Building, located on Franklin street, or other place in said city equally and properly located. Said gauge shall be placed five feet above the street grade and shall be directly connected with the company's largest main in the street adjacent to such location.

When an alarm of fire is given at the pumping station the company shall at once, unless prevented by unavoidable accident, increase the water pressure on its mains so that a supply of water will be furnished at its hydrants at a pressure sufficiently strong to afford efficient fire service.

That the system when enlarged, as herein specified, shall have sufficient capacity and power to throw seven streams of water vertically 100 feet through 50 feet of 2½-inch hose and 1-inch nozzle, or maintain its equivalent in pressure at the hydrant. Provided, that at least four such streams shall be taken from hydrants located in the main business portion

of said city and not more than one such stream shall be taken from any single 6-inch main. And the city shall have the right to require a test of such capacity and efficiency at any time when it shall have reason to fear that the efficiency of the system is impaired, and in the event that the system shall fail to perform the said test the company shall proceed at once to put it in condition to comply with such test. Provided further, that such test shall not be required during the hours set apart for lawn sprinkling during dry seasons.

That whenever any excavation is made in any street the said company shall keep and maintain sufficient barricades at such excavation and take such other action as may be necessary and proper to prevent accidents to persons or property, and the grant hereby given is upon the express condition that the company will protect and keep harmless the city from any damages that may accrue in any manner to any person or property by reason of any such excavation or work in said streets or public grounds.

That the company will extend its mains on streets in locations which are amply provided with water for fire protection, but upon which streets it is necessary to have water for domestic use, upon condition that the owners of real property abutting on the street upon which mains are desired, will guarantee to the company that the income from the consumers located on such extended main will at least be sufficient, at the established rates, to pay a reasonable net income on the actual cost of making such extension.

That there shall be no unreasonable or unnecessary obstruction of the streets, alleys, sidewalks or public grounds of the said city by the company in the construction of the said works, or in placing, taking up or repairing any mains, hydrants or other structures or devices requisite for the service of water. And the company after using the streets, alleys, sidewalks and public grounds of the city shall restore them within a reasonable time as near as practicable to their former condition. In all street excavations the company shall keep red lights burning at night along the line of the same, and shall erect and maintain sufficient barricades at the end of said excavations.

That the company will be required to furnish water only on the line of its mains during said period and upon the terms, conditions and for the prices herein specified.

That the said city, in consideration of the faithful performance of the covenants and agreements herein to be performed, kept and fulfilled by the said company, covenants, promises and agrees:

That it will pay semi-annually on the first day of May and November each year, during the continuance of this contract, at the Treasurer's office of said city, the sum of $40 per hydrant per annum as rental for the number of hydrants in use on said 29th day of April, 1909, viz., 284.

The city shall place upon the extended mains of the company, hereinbefore specifically stipulated, 26 additional fire hydrants, for which a rental of $40 per hydrant per annum will be charged and paid. The last named hydrants to be furnished by said company and located by the city from time to time as such mains are laid and extended; the rental therefor to commence from the time the respective hydrants are placed and ready for use. The said hydrants are to be located on the above extended mains as follows, viz.:

Here are given the locations for the 26 fire hydrants specified.

That on all extensions of the company's mains, hereafter made upon the order of the city, the city will locate a fire hydrant for each 500 lineal feet of pipe laid, and will pay to the company for such hydrant from the time it is ready for service the sum of $40 per annum, payable at the same time and manner as other fire hydrants are paid.

That the city will from time to time upon request furnish the company with proper grades on all streets where water mains are ordered or authorized to be laid. And if the city shall change the grade in any street or alley in which the company shall have laid a main, and such change shall exceed one foot, and if the company shall be compelled to relay said mains on account of such change, then the city shall reimburse the company for the actual cost thereof; provided, that the tops of all mains shall be laid at least five feet below the grade of the street.

That said company shall have the right and privilege to maintain and operate its water works system in the city for a period of 25 years from and after the said 29th day of April, 1909, and to furnish and supply the said city in its corporate capacity and the inhabitants of said city with wholesome water free from impurities and fit for domestic use, upon the terms and conditions herein set forth, and to charge for water supplied to its customers and patrons the prices hereinbefore specified. And to use the streets, alleys and public grounds, the rivers, streams and bridges of the city within its present and future corporate limits, for placing, taking up and repairing mains, hydrants and devices requisite for the service of supplying water. Provided, that the said company after using the said streets, alleys and public grounds shall restore them within a reasonable time as near as practicable to their former condition.

That the city will from time to time pass such ordinances as may be reasonable and necessary to protect the company's property and rights to enable it to perform its duties, and said company shall have the right to adopt and enforce such reasonable rules and regulations as are necessary to enable it to properly perform its duties and conduct its business, which are not inconsistent with this agreement or its duties as a public service corporation. And shall also have the right to fix and charge a reasonable rate for any water service not herein specifically specified.

It is mutually understood and agreed that the city shall have the right and privilege, at its option, on the first day of April, 1915; on the first day of April, 1920; on the first day of April, 1925; on the first day of April, 1930, respectively, and at the expiration of the term hereby created, to purchase, acquire and become the owner of the company's water works, including all extensions and enlargements thereof, on paying therefor the fair and equitable value thereof. In the event that the city and company cannot agree as to price, three disinterested appraisers and of good intelligence, not residents of the County of Elkhart, shall be chosen and sworn to determine the fair and equitable value thereof; one to be appointed by the said city and one by the company and the third by the two so appointed. When said three appraisers shall have been chosen, and before they determine the value aforesaid, the city and the company shall, each at its option, have the right to call experts, not exceeding three in behalf of each party, to give testimony under oath before said three appraisers and submit documentary statistics and authorities as to such fair and equitable value. The said appraisers shall then proceed to determine said value; and in so doing they will take into consideration that the plant is a going concern. When the three, or their majority, shall have made an award in writing of such fair and equitable value of the property, then said city shall have the option of refusing to pay for said works after such award shall have been made, or of paying in cash to said company, within three months from the date of said award, the amount thereof. And if the said city shall refuse to purchase as aforesaid, it shall pay the necessary expenses incurred in getting said award. If the city shall determine to avail itself of the right to purchase said works it shall give to the company written notice of such determination at least one year in advance of the respective date it determines to purchase the same.

In determining the fair and equitable value of said water plant as aforesaid the value is not to be determined by said appraisers by a capitalization of the earnings of the company or the franchise granted by the city to the company.

It is further mutually agreed that neither of the parties hereto shall sell nor assign its rights and privileges hereunder, without the written consent of the other party endorsed hereon, and that this agreement shall enure to and be binding upon the respective parties and their successors.

It will be noticed in the above that the exact method is specified by which the city may obtain possession of the plant, and that in this the appraisers shall take into consideration the value of the plant as a going concern, and that the value is not to be determined by a capitalization of the earnings or of the franchise.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Police and Fire Items—Government and Finance

ROADS AND PAVEMENTS

Binder Makes Roads More Durable

Albany, N. Y.—A radical departure in the construction of highways to provide against damage by automobiles is under contemplation by the State Highway Commission. "It has been found," says the Commission, "that if the top course be constructed with a bituminous binder a resiliency is imparted which adds to the permanency and durability of the road and the fine material is held in place, which not only does away with the dust nuisance, but also prevents the rapid deterioration of the roadway. While the original cost is somewhat larger, the decrease for maintenance and repair more than offsets the increased cost. It has been decided that even the roads which have already been contracted for shall be laid under the new plan, and the contracts will accordingly be changed and provision made to meet the additional expense.

Track Elevation Pays For Itself

Chicago, Ill.—"Track elevation has prevented to date about 1380 grade crossing fatalities and about 2510 non-fatal accidents," is the statement made by Commissioner of Track Elevation, Walter J. Raymer, in his first report now published. On the basis of $53,622,000 already spent, each grade-crossing accident prevented to date has been effected at an expense of $13,800. Future outlay for track elevation will reduce the $13,800 to $3,000 within two generations, on the basis of an expenditure of $150,000,000. A summary of the figures showing the decrease in crossing accidents was tabulated as follows:

Year.	Population.	No. fatal.	No. non-fatal.	Total No.	Total rate per million.
1899	1,626,333	113	169	282	173
1900	1,698,575	97	105	202	119
1901	1,757,010	64	91	155	88
1902	1,815,445	61	122	183	101
1903	1,873,880	69	169	238	127
1904	1,932,315	55	172	227	118
1905	1,990,750	99	48	147	74
1906	2,049,185	68	65	133	65
1907	2,107,620	38	62	100	47
1908	2,166,055	20	27	47	21

Dallas Paving Record, 1908 and 1909

Dallas, Tex.—According to the report of City Engineer J. M. Preston, for the year ending May 1, 1909, 26 miles of sidewalk were completed last year. For street paving of a permanent sort there was expended for macadam $55,686.66, for brick $60,355.45, for bitulithic $98,472.20, for creosoted blocks $1,294.60, and for miscellaneous sorts $3,329.20.

REFILLING CANAL AT GALVESTON, TEX.

Automobile Tests Of Roads In Long Island

Jamaica, N. Y.—Road tests of the effect of automobiles on macadam roads were recently made on Hillside avenue. The tests were observed by members of the American Automobile Association and a party of army officers, including Brigadier General James B. Aleshire, Major D. S. Stanley and Major Spencer Cosby. The object of the tests was to secure data to aid highway engineers in meeting the conditions resulting from motor traffic and to aid legislators in enacting proper laws.

Start Building Los Angeles System Of Highways

Los Angeles, Cal.—Ground was broken, May 14, on the El Monte road, the first of the good roads planned by the county under the bond issue of $3,500,000. Contractor Frank Gillispie, to whom was awarded the contract for two and a quarter miles of road held the handles of the plow which broke the first ground.

Condemns 40 Per Cent of Paving Brick

Macon, Ga.—The paving of Poplar street was recently stopped temporarily because the supply of brick gave out. City Engineer Wilcox is quoted as saying that the quality of the brick is not running as well as at first. He started with only discarding 20 per cent as not suitable for paving but later the per centage reached 40.

Oakland Considering Municipal Asphalt Plant

Oakland, Cal.—The City Engineer, Frederick C. Turner, and Superintendent of Streets Walter C. Howe, have been asked by Council to report on the advisability of establishing a municipal asphalt plant. A large number of the Council are in favor of such a plant and would like to have one similar to that recently put in operation in San Francisco.

Cement Curb and Gutters Introduced in Trenton

Trenton, N. J.—City Engineer Abraham Swan has introduced cement curbing and gutters into Trenton. The material will be tried on paved streets and more particularly in the outlying streets, whether they are paved or not.

Galveston Grade Raising Progresses

Galveston, Tex.—Grade-raising work is now going on in Galveston in the canal area between Fifteenth and Nineteenth streets. The refilling of the canal has been completed to Nineteenth street. The dredges shown in the distance on the left are at Thirteenth street. They are discharging at various points along the canal. The pipes to the extreme right, lying on top of the sea wall are oil and water pipes. The second illustration shows grade raising at Broadway and Nineteenth street. The car tracks are on Broadway and are raised from time to time as the filling progresses.

RAISING GRADE OF STREET, SHOWING FLOOD OF WATER

COST OF ORDINARY CONCRETE BASE

Compared With Hassam Foundations—Specifications Providing For Alternative Use Discussed

Newark, N. J.—Major J. W. Howard has mailed a formal remonstrance to the Board of Works against the award of contracts for the paving of several streets, on the ground that a clause in the specifications allows too much discretionary power with the Chief Engineer in the matter of determining whether the concrete foundation shall be composed of concrete six inches deep, or dry, broken stone rolled into the bed and covered with a mixture of cement grout according to the Hassam process. The concrete of the regular kind is said to cost from 70 cents to 90 cents a square yard. Mr. Howard says that the Hassam process costs from 20 cents to 40 cents less. This he asserts makes it possible for the engineer to favor certain contractors, because all would bid on the higher material, unless they knew a change would be authorized. Major Howard favors alternative bids covering each method.

Engineer M. R. Sherrerd, who is supported by the Mayor, defends his specifications on the ground that they permit him to exercise his discretion only when "a better concrete foundation can be obtained" by the change. To change to a plan of optional bids would enhance rather than decrease the cost of pavement contracts.

Concrete Foundations Not Always Necessary For Brick

Leavenworth, Kan.—The advisability of dispensing with concrete foundations for brick pavements is under discussion. Wiley Murphy, who says he has had thirty years' experience in laying pavements in Chicago, Atchison and other cities, states that it is his experience that where a good dry roadbed is found a single thickness of good brick, laid on a bed of sand and properly grouted is all that is needed for residence streets, and in no case would he use the expensive concrete foundation. A two-layer brick pavement, he says, will last as long as a pavement laid on concrete, is far less noisy and costs not more than half as much.

To Test New Paving Mixtures in Patches

Trenton, N. J.—Two kinds of paving material will be tested on East State street in patching the asphalt pavement. Amusite will be used on one side of the street and Filhestite on the other.

New Law Requires Assessment Per Linear Foot

Scranton, Pa.—City Solicitor David J. Davis received a copy of the act governing paving by assessment in cities of the second class, Scranton and Pittsburg, which is now a law, and upon a perusal of its terms discovered that the per linear foot on the assessed valuation of property, under the act, will govern the assessment for paves, sewers and similar improvements. This does away with the practical work of the viewers, who have been accustomed to making a special survey of each property and determining, in their judgment, how little or how much according to benefits should be paid towards any special improvement affecting that property. The practice has been looked upon as somewhat of a sinecure, handed out by the court to needy young lawyers and deserving newspaper men. While viewers are not absolutely done away with under the new law, their work is made more perfunctory, and for small jobs, such as for one or two blocks, they will not be required at all. Also, it is expected that the lack of necessity for actual work, may cut down the bill which the viewers submit for their services. There has been great trouble over these bills in the past, the court having ruled, in effect, that what a viewer claimed that much he should get, unless the city could prove that he was not entitled to it. The burden of proof, in other words, was put on the city. For that reason a viewer's clerk in the city solicitor's office was one development of the situation. It also was finally agreed upon that $5 a day was the legal pay for a viewer, who to earn this must work five hours, or at least, make it impossible for the authorities to prove that he didn't work five hours. "The law is simply a return to conditions we had before the 'Ripper,'" said City Solicitor Davis. The new ordinance for pavements will have to be revised to fit in with the requirements of the new law.

Arranges For Better Care Of Streets

Scranton, Pa.—Besides passing the asphalt repair contract with its five-year provision, Common Council took a step toward preventing the tearing up of pavements by corporations and individuals on slight pretexts. If a measure introduced by Thomas W. Thomas, of the Fourth ward, goes through, real money will have to be paid the city for every break. Where the pavement is asphalt or bitulithic the charge will be $18; for brick, $15; for Belgian block, $12; for cobble, $10; for macadam, $8. For each break the specied amount shall be deposited with the city and the repairing shall be done under the supervision of the Department of Public Works, instead of by the corporation or individual, as at present. The charges for the repairs shall be deducted from the deposit and if there is any left it would be refunded. In this way it is thought that delays in fixing the pavements after they have been broken for sewer or heating connections, would be done away with. In addition to the deposit, an application fee of 50 cents must be paid. The ordinance was referred to committee.

SEWERAGE AND SANITATION

Must Not Sprinkle Lettuce With Sewage

Baltimore, Md.—The State Board of Health has issued an order providing for the condemnation of all vegetables grown with the use of sewage as a fertilizer, unless it is used according to an order of the board. The decision of the board was arrived at through an examination of the vegetables grown on Patapsco Neck, where the use of sewage is most popular, and was brought about through correspondence with the surgeons at Fort Howard and two years' examination of the vegetables grown on the Neck. It has been the custom to pump sewage from scows into sprinkling wagons and water the market gardens with it. Under the ruling of the board it is declared unlawful to sell any vegetables which come in direct contact, through sprinkling, with the sewage, and it is provided that all vegetables thus grown and displayed on sale in markets shall be declared diseased, unsound, unwholesome, and subject to condemnation by an inspector of the board. Sewage can be used as a fertilizer, the board concedes, only when it is mixed with an equal volume of lime, earth or similar inorganic material, and used on the fields only when buried two inches below the surface.

Will Test Sewer Law

Millville, N. J.—City Solicitor Louis H. Miller has been instructed by the Board of Health to bring suit against Eugene B. Goodwin, who has repeatedly been notified to abate alleged nuisances by connecting his properties with the sewer system. There are a number of property holders who have ignored the notice of the Board to connect, and the case against Goodwin will be a test of the law.

Discuss War On Flies

San Antonio, Tex.—The inspection of the general sanitary conditions of the city, that it be thoroughly planned and systematized and that the officials begin the investigations at once and that they be continued for weeks, if necessary, in order to exterminate the fly and mosquito in this city, formed the topic of discussion at a recent meeting of the members of the City Health Department. The Health Department officers all agree that the personal inspection be thorough. County Physician D. Berrey, who was present at the session, declared that such an inspection was imperative and that it should be done by all means. The co-operation of every resident, according to Dr. Barnitz, president of the board, is needed to attain good results. It is believed that the great majority of citizens are lending their aid in the determined fight for the eradication of the fly and mosquito pests. Without the earnest support of the citizenship, the health members say that the fight is useless. With every property owner carefully keeping their respective premises in a thoroughly clean and sanitary condition, the members are confident there will be no cause for complaint, either of the house fly or the mosquito.

WATER SUPPLY

Guards to Stop Water Company

Jersey City, N. J.—Engineer J. W. Griffin, of the Jersey City Water Department, has received word that the East Jersey Water Company or its allied interests are trying to lay a pipe line along the Arlington road at the northern end of Hudson County to connect with North Arlington in Bergen County. To prevent the laying of this pipe without permission two deputy sheriffs have been stationed at the Arlington road to keep tabs on the water company employees and guard against surprises. Jersey City and the Suburban Water Company are both trying to make a contract with Borough of North Arlington. Jersey City has offered to supply Boonton water at $60 a million gallons. The Suburban Water Company, which is allied with the East Jersey, has offered to supply water from the Passaic River shed at $82.50 per million gallons. The North Arlington officials have the two offers under consideration.

Water Board May Supply Ice

Holyoke, Mass.—The Aldermen are aroused over the fact that, notwithstanding an abundance of ice was harvested from the city reservoirs last winter, the price to retailers is 40 cents a hundred pounds, double that of last season. Alderman Finn says that one company ships ice out of the city at the rate of $2 a ton, while it charges $4 to local consumers. The Aldermen say they intend to investigate the matter and propose, if possible, to provide measures whereby small buyers may be protected from exorbitant prices in normal seasons. It is further proposed to learn if the Holyoke Water Board may legally harvest and sell ice from the city reservoirs, thereby establishing a municipal ice plant.

Engineer Wants Five Per Cent On Cost Of Work

Lockport, N. Y.—Charles A. Hague, the civil engineer who designed Lockport's water supply system, has presented the city a bill of $25,000 for services. The city thought it had paid him in full. Mr. Hague got $1,000 for investigating the Niagara River source three years ago. When it was accepted he was given $1,300 to prepare the plans and specifications. Now he demands for the latter work $23,700, in addition to that paid him, on the ground that he is entitled to 5 per cent of the total estimated cost of the whole system. The city officials treat his bill lightly, claiming that he got every cent he was entitled to under the contract which the city had with him. The bill, however, has created a stir.

Water Commission Favors Filtration

Minneapolis, Minn.—The members of the Citizens' Water Commission who have made a tour of the East investigating various systems of water purification have returned to the city. Either slow sand or mechanical filtration of the river water will be recommended. Those who made the trip were Cavour Langdon, Thomas Voegli, Dr. R. O. Beard, J. R. Kingman, F. L. Palmer and Prof. J. J. Flather of the university, who was invited to accompany the party. All the leading water purification plants of the country were visited.

City May Analyze Mineral Water

Nashville, Tenn.—City Health Officer Dr. W. E. Hibbett, in discussing the bill pending in the City Council proposing to amend the existing ordinance regulating the sale of mineral water, said the result of the bill would be to load the office of City Bacteriologist and Chemist unnecessarily, and impose upon it a duty that it has neither time nor equipment to take care of. The bill now in existence provides that all persons selling mineral or other waters for human consumption shall first have such waters submitted to a sanitary and bacteriological analysis, and the amendment provides that the analysis shall be made by the City Bacteriologist and Chemist, and that the fee paid for the same shall go to the city. Dr. Hibbett's argument is that the office already has plenty of work, and that to do the work additional apparatus would be required which would call for a considerable expenditure. The amendment provides that the fee for each examination shall be $5.

RESERVOIR LEAK DUE TO ROTTEN ROCK BASE

Baltimore Investigates Forest Park Water Receptacle—May Get Report from Engineers

Baltimore, Md.—The City Council is wrestling with pretty big problems, one of them being to determine how much the new high-service reservoir being built at Forest Park is leaking. Addison E. Mullikin, of the Eleventh Ward, is responsible for a surprise sprung on the First Branch by his announcement that the base of the reservoir is of "rotten rock." He declared that the situation was such as to warrant the city in engaging consulting hydraulic engineers—Frederick Pike Stearns and John Ripley Freeman—to make a report. Mr. Mullikin's resolution to that effect finally has found its way to the Committee on Water. The committee will consult with Water Engineer Quick and City Solicitor Poe.

Million-and-a-Half-Gallon Leak Found

Newport, R. I.—A mysterious drop in the level of the reservoir amounting to two inches a day led to an investigation, resulting in the discovery of a leak from which 1,500,000 gallons of water a day were escaping. The water flowed from the break into the sewer along Cliff avenue. The leak was not causing any special inconvenience at the time, as the recent rains furnished an ample supply.

Staten Island Doesn't Want Jersey Water

Newark, N. J.—While the State Water Supply Commission was in session in the City Hall, a telegram was received from R. C. Nellis, of Staten Island, asking that, if the commission did not refuse the application of the Hudson County Water Company for permission to divert water to Staten Island, that the hearing be postponed for one week. The message explained that the reason for this request was in order that a delegation of Staten Islanders could present a petition protesting against the sending of Jersey water to Staten Island, where it is not wanted. Mr. Nellis said at his home that he was prepared with abundant data which he believes will convince the commission that Staten Island is not in need of a supply of well water or any other kind from this State. He will produce expert testimony, he added, to show that the island has a practically inexhaustible supply of well water ready for development.

City Officials Inspect New Reservoir

Wilkes-Barre, Pa.—The Deep Hollow Dam, with a capacity of over a billion gallons, erected by the Wilkes-Barre Water Company for the purpose of supplying the high sections of Wilkes-Barre, which has been completed and filed with water, was visited by a party of Councilmen, city and water company officials and guests, all of whom were entertained by Col. Watres, of Scranton. The trip was made by special car and wagons. The canal which was constructed to carry the water from Mill Creek to Laurel Run Reservoir, was inspected. It was blasted from the solid rock along the edge of the mountain. The current was deep and swift, and the water has a clear appearance. Later the trip was continued to Deep Hollow Dam. The elevation of this dam is 1,121 feet above tide level and contains 11,000 cubic yards of masonry, took a year and a half to build and holds 1,000,000,000 gallons. The Mill Creek Reservoir was next examined. Its elevation is 1,432 feet above tide level, is 1,300 feet across and has a capacity of 7,500,000,000 gallons.

Would Filter City's Water

Niagara Falls, N. Y.—The Water Commission has received filtration plans from representatives of two concerns. Wesley S. Block, representing the Sucro Filter Company, of Germany, urged the Board to adopt the system installed by his concern, which he said was in use in a part of the German army. The Sucro company filtered the impure water through an asbestos sheet and a bed of gravel. John T. Denison appeared on behalf of Norwood Engineering Company, of Chicago and Buffalo. He said his firm's plan of filtration was in use in the Chicago stockyards. The method was to filter the water through sand and after filtering, the water was treated to ozone. He maintained that an application of ozone was necessary after filtration.

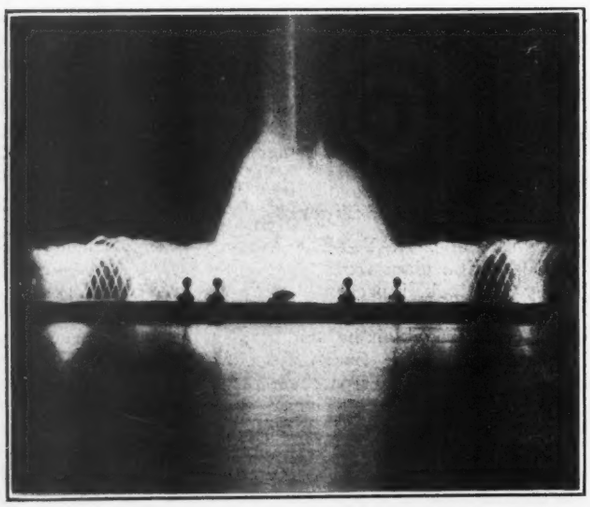
STREET LIGHTING AND POWER

Settlement Offered for Damage by Electrolysis

Newark, N. J.—In reply to the demands of the city that the Public Service Corporation pay for damage to the water mains from electrolysis, the Finance Committee of the Board of Works has considered a compromise proposition on the payment of the costs. The damages claimed total $6,400, and of this amount the Public Service is willing to pay a little more than half. The payment will be made, however, without implying an admission of the company's liability in the matter. This stipulation, it is understood, is made in order that the settlement of the present claim may not be used to pejudice the company's course in the future. In a letter to Chief Engineer Sherrerd, of the board, it is set up on behalf of the Public Service that the cost of the electrolysis investigation instituted by the city should be eliminated from the board's bill. This represents an item of $1,500 paid to William E. Foss, an expert engineer, for conducting the inquiry, together with expenditures incurred by cutting holes in the street pavements for testing purposes. The commissioners instructed the chief engineer to write the Public Service, offering to settle the dispute if the company will, in addition to its present offer, pay one-half of the cost of the investigation conducted by Mr. Foss.

Denver's Electric Fountain

Denver, Col.—The electric fountain in the city park, which attracted so much attention last year, will be in operation again. The fountain throws about 4,000 gallons of water per minute. The operator is located in a tower, where he can see the effect and vary the control of the water and the color of the lights. The color slides and water valves are moved by compressed air, which is controlled by electric magnets operated from handles in a roll-top desk in the tower. A man is stationed under the fountain to attend to the air compressor and other machinery. The light is obtained from eleven large searchlights located in a cross formed chamber beneath the fountain. The long arm of the cross is 66 feet and the short one 30. The lights are of 8,000 candle power. The beautiful color effects are produced by interposing the proper shades of colored glass over the searchlights. There are nine plates of different colored glass over each light. The colors are dark and light red, dark and light green, dark and light blue, orange yellow and lavender. The spray effects are produced from 2,012 nozzles, arranged in twelve different groupings, each controlled by a separate valve. The valve controlled by the operator in some cases produces from a single set of jets several different displays, according to the extent of the valve opening. For one set the valve is opened very slightly and produces what are known as "beehives." When opened wider "sheaves of wheat" are produced. Opened still wider, enormous vases are formed. Many different combinations of water and light may be worked out by an ingenious operator.



ILLUMINATED FOUNTAIN, DENVER, COL.

Gas Company Settles Tax Dispute with City

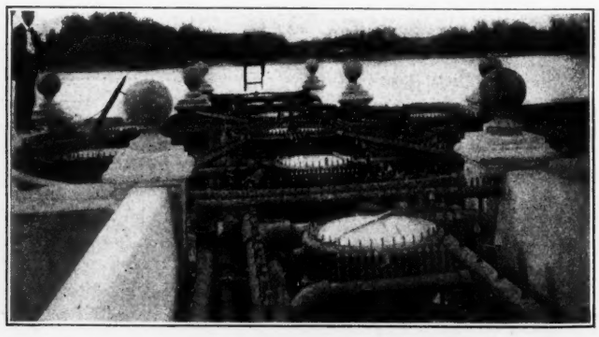
Baltimore, Md.—The long-drawn-out easement tax fight between the city and the Consolidated Gas, Electric Light and Power Company, which has been vigorously waged through the Appeal Tax Court and the city's Law Department since 1904, culminated in a settlement of differences which marks a substantial addition to the immediate receipts of the city treasury and handsome yearly increment for the future. In the easement tax contests the Consolidated Company has had to bear the brunt of the battles. Three times it has locked horns in the City Court with the Appeal Tax Court, and twice the question of its easement tax has been before the Court of Appeals. In 1907, Judge Stockbridge, of the City Court, fixed the easement value at $3,230,000, and the company has since then maintained that this valuation should prevail for the future. This view, however, was not shared by the city's taxing officers, who immediately proceeded to make an independent valuation several millions in excess of the 1906 figure. By the terms of the settlement, announced by City Solicitor Poe, the assessment for the present year has been placed at $4,900,000, with an additional $100,000 for the Baltimore Electric Company, one of the subsidiary companies of the Consolidated. An agreement was also reached on the basis for back years, to reflect the slightly lower values at that time. It is roughly estimated that the total tax payments into the city treasury, to be made by the company as a result of the settlement, will exceed $350,000. The State will be a gainer by about $120,000 in State taxes.

New Wiring Code for Cleveland

Cleveland, O.—Building Inspector Lougee is preparing a code to regulate methods of electrical wiring to be introduced at the City Council at once. "We have only a few old laws regarding wiring," said Mr. Lougee, recently. "The new code will be up to date." It covers 25 pages.

Electric Power Rates Cut by City

Pasadena, Cal.—Pasadena is to have the privilege of having the lowest electric power rates in Southern California. While the previous minimum rates under the most favorable circumstances have been 2 cents, the cheapest rate now to be had is 1½ cents per kilowatt, and rates of 1¾ cents and 1.9 cents and 2 cents are furnished users of even moderate amounts of electrical current for power purposes. On the second step the reduction is half a cent. From 100 to 500 kilowatt hours per month, the new rate is 2.4 cents per kilowatt. In the old ordinance the rate was 2.9 cents per kilowatt for power over 100 kilowatts and less than 1,000 kilowatts. On the first step of power consumption there is no change. The city uses the established rate of 4 cents per 100 kilowatts. Over 500 kilowatts and less than 1,500 kilowatts, the new rate is 2 cents. The corresponding step was formerly "over 1,000 kilowatts and less than 4,000 kilowatts, 2.5 cents." Over 1,500 kilowatts and less than 5,000 kilowatts, the new rate is 1.9 cents per kilowatt. The corresponding step was formerly "over 4,500 kilowatts and less than 10,000 kilowatts, 2 cents." Here the old ordinance failed to make any further reductions. But the new ordinance goes right on, beginning at half of the maximum amount mentioned in the old ordinance. The next step is that to consumers of more than 5,000 kilowatts of power electricity per month, the rate is 1¾ cents per kilowatt. Provision is also made for other reductions.



MECHANISM UNDER FOUNTAIN

FIRE AND POLICE

Berkeley to Install Finger-Print System

Berkeley, Cal.—Berkeley is to be one of the four cities in California to install a complete finger-print and Bertillon system of identification for criminals, according to the action of the city's trustees, which granted the request of Chief of Police Vollmer for apparatus for this work, as well as the employment of William D. Floyd to take charge of the department.

Will Not Insure Fire Houses

Bridgeport, Conn.—The decision of the Board of Fire Commissioners to drop the bulk of the fire insurance which has been carried for years upon fire houses and their equipment, exclusive of horses and apparatus, was conveyed to the Common Council in the annual report of the Department, thereby providing an unexpected settlement of a question which has long been mooted by city officials. The advisability of insuring fire houses against fire and the questionable investment for the city by doing so, claimed the attention of Mayor Henry Lee shortly after he took office. He raised the question and there was a difference of opinion regarding it. The argument was made that a fire house ocupied 24 hours each day by firemen and apparatus and every day in the year, with the exception of the time when the firemen are responding to an alarm, should be in the least danger of fire, especially when one man is left at every house during a fire.

Police Must Report Before Going Home

Columbus, O.—By order of Chief of Police O'Connor, the Third battalion of police which is on duty from 8 o'clock at night until 6 o'clock the next morning will be required to answer roll-call at the police station at 6 o'clock in the morning. Heretofore the officers of this battalion have been allowed to go directly home from their district. An order was also issued establishing company drills which will be held at the police station drill hall between 5 and 6 o'clock in the evening.

Debate on the Bonding of Fire Department Drivers

Lockport, N. Y.—At a meeting of the City Council, Alderman Miller said that he thought the Fire Department team should be insured against accident. The question was referred to the Finance Committee to get rates and report. A lengthy discussion was indulged in on the question of requiring the driver of the hose wagon to furnish bonds. The Mayor thought it ought to be done, as he would realize the responsibility of his position in case any accident should occur through negligence in the performance of his duty. Alderman Macklin said few men would want to sign the driver's bonds because of the danger that is involved in driving to a fire. The Mayor said no blame would be attached to the driver for any accident unless caused by carelessness or inability to perform his duties, and the same will apply to the engineers at the water works, who are required to give bonds. Ex-Chief Ross, said that in his opinion it was unjust to place the driver under bonds. Alderman Foster said that any person or persons who had knowledge of the facts would be eligible as witnesses.

"Finder" Not "Keeper," When He Is a Policeman

Washington, D. C.—"Finders keepers" was not written for the members of the Washington Police Department, and is not true so far as they are concerned. Policeman Beauregard of the sixth precinct recently made application to Police Chief Richard Sylvester to have returned to him a diamond ring which he found in July, 1908, and which is in the hands of the Property Clerk and still unclaimed. Reporting on the matter, Corporation Counsel E. H. Thomas said to the Commissioners:

Ordinarily the finder of property has a good title to the article found as against all the world except the true owner. As to the lost property found by members of the Police Department, however, the rule of the common law has been changed by sections 410, 416 and 417 of the Revised Statutes relating to the District of Columbia. By sections 410 and 416, policemen are required to turn over such articles to the property clerk of the Police Department, and by section 417 the property clerk is required to hold them for a period of six months and then to sell them, and the proceeds of such sale shall be paid into the policemen's fund.

New Police Telephone System for Columbus

Columbus, O.—The new system for communicating police matters by telephone, which required the appointment of the three additional operators, is being installed at the police station. The desk sergeant's board which has been in for several months waiting for Council to create the positions for the necessary operators, is being connected up and will be in full operation in a few days. The operators on the desk sergeant's board will have the rank of sergeants and will have authority to detail men and handle complaints. The old operators, John Park, Peter Ambos and Walter Graham, will have charge of the new board and the new operators will have charge of the old board, over which patrolmen's reports and wagon calls only will pass. All calls from the city except from the police boxes will come over the desk sergeant's board, and it is so arranged that any department at the police station can be reached. It is the plan to have but one number of a series of consecutive numbers for each of the city phones for the police station to avoid confusion.

Fire Department Record

Kansas City, Mo.—The firemen at headquarters have a copy of a Salt Lake paper in which the assertion is made that Salt Lake City has the fastest fire-fighting team in the world and that the record for the "quickest hitch" is held there. The article tells of the "record hitch" in nine seconds and a floor hitch in two and three-fifths seconds. The local department has an official record of eight and one-half seconds for a hitch in which the men were lying in bed when the gong sounded. The horses were fourteen feet from their collars. The men slid down the poles, made the hitch and as the back wheels of the fire wagon cleared the doors of the station the watch recorded eight and one-half seconds. The floor hitch has been made here many times in one and two-fifths seconds, the firemen claim.

Twenty-four Would-be Firemen Tested

Rochester, N. Y.—At the police gymnasium the Civil Service Commission tried out twenty-four candidates for positions as firemen in the city's service. All but one of the aspirants qualified for a place on the eligible list. There remain twenty-three to be examined to fill out the quota of seventy-one young men who have already taken the mental test. Until this time no candidate had turned in a perfect score for all the five stunts prescribed. One man, whose name is withheld by the commission, turned the trick recently. He ran the half-mile in a trifle under 2.40 and made a perfect showing in the four other events. Two men ran the half-mile in 2.45 and several other good records were marked up in the other work-outs.

GOVERNMENT AND FINANCE

Favors One Board with Wide Powers

Baltimore, Md.—With public sentiment thoroughly aroused as it is at present over the administration of municipal affairs, former City Solicitor Bruce believes that the time is ripe for a decided change in the system of city government. "The Board of Awards and the Board of Estimates should be merged into one board with wide powers," said the former Solicitor. "In the new board there ought to vest all the city's executive and legislative powers. The Mayor, of course, would be a member, and I think the officials who are now members of the two boards should be members of the new one. Whether or not there should be a few other members is more or less problematical, but if so they should be men of unquestioned fitness, elected from the city at large. Doing away with the City Council would be a great stride forward in municipal affairs. There are a great many good and capable men in the Council, but the Council is an unwieldy body, and divested as it is even now of most of its former powers, it is not a very useful one. Such an innovation as I propose would have the effect of breaking down the ward lines so far as city affairs are concerned and taking them out of politics. The city would then be run strictly as a business corporation. The members of the board would be responsible to the people, and better government would result."

Suburban Section Plans to Form New City.

Fruitvale, Cal.—Attorney R. J. Silva has issued a call for a meeting of fifty citizens of Fruitvale, Melrose, Fitchburg, Allendale and Elmhurst, at which plans for a campaign seeking the formation of a city government are to be discussed and launched. These plans include the drafting of a charter for the 60,000 inhabitants included within the district. The proposed charter is to be based upon and include the features of the charters of Des Moines and Galveston. Proceedings are undertaken at this time in order that they may be successfully completed before the meeting of the legislature two years later. One of the chief features of the movement is the consolidated city and county government idea. It is believed by a great majority of the residents of the East Oakland suburbs, who are behind the project, that the consolidation of Fruitvale, Elmhurst, Melrose, Diamond, Fitchburg, Allendale and Brooklyn township (outside) will place them in a much stronger position in their support of the consolidation movement. The district to be included in the new city extends from the estuary on the south to the Contra Costa county line on the north, and from the Broadmoor tract, at the western edge of San Leandro, to the Oakland city line at Twenty-fifth avenue. The district contains some 60,000 residents, and the promoters of the project point to the fact that at the time of the incorporation of Oakland it had but 20,000.

Kansas Town Without a Debt

Edna, Kan.—While nearly every town in Kansas has a floating and bonded indebtedness it is refreshing to have this monotony broken by this town which is not only out of debt, but the retiring administration turned the affairs of the town over to the new Mayor and Councilmen without a dollar indebtedness and with $60 in the treasury.

"Is a Horse a Supply?"

New Bedford, Mass.—"Is a horse a supply?" That is the question the City Council Committee on Fire Department has just decided to ask of the City Solicitor. Three new horses are needed for the Fire Department, Chief Dahill said, and after some discussion as to how purchases could be made except by getting bids, it was voted to ask the City Solicitor if the purchase of horses falls within the limits of the ordinance requiring competitive bids. Chief Dahill stated that one of the horses at the west station had to be taken out of the service, and that a new pair is needed for No. 7 fire engine.

Indirect Advantages of Good City Government

New Britain, Conn.—Mayor George M. Landers closes his annual message with the following words on the value of good municipal government. "The standard of municipal government is being raised continually. People are beginning to realize that apart from the benefit in which every citizen shares because of judicious and honest expenditure of public funds, that the outside world forms its opinion of a city and of its citizens, to a very large extent, by the kind of local government there prevailing, the way the various departments are conducted, and the extent to which public pride is shown by those improvements which mark the up-to-date American city of our size."

REFUSE COLLECTION AND DISPOSAL

Reduction Company Offers City Dumping Privilege

San José, Cal.—At a meeting of the Mayor and Common Council a communication was read from the San José Sanitary Reduction Company offering the free use of its premises on the Senter road to the city scavengers on the condition that the Mayor and Common Council rescind the ordinance imposing a license upon the collectors of garbage, thus saving a considerable expense to the city and relieving the annoyance of many citizens residing in the vicinity of the municipal dump on the Richter premises in the southeastern part of the city, and at the same time relieving the city of the peculiar position of violating one of its own ordinances which forbids the dumping of garbage within the city limits. Mayor Davidson thinks the real solution of the difficulty would be for the company to hurry up and complete its incinerating plant.

Old Garbage Reduction Plant Desired as Fertilizer Factory

South Baltimore, Md.—The people of South Baltimore are vigorously opposing the proposition for the city to lease one-half of the site of the old garbage reduction plant, at the foot of Covington street, to the American Cyanamid Company. The company manufactures a fertilizer, and while its representatives say that its products do not emit obnoxious odors, yet the residents believe that the plant would be another nuisance to South Baltimore. It required several years of effort to get the city to remove its garbage reduction plant. The company offers the city $1,000 a year for one-half the site. The other half is used as stables for the Street Cleaning Department.

Reports in Favor of Utilization

Jacksonville, Fla.—The Board of Public Works has had before it the problem of the sanitary and economical disposal of garbage. Henry G. Aird, of the Board, and R. N. Ellis, superintendent of the electric light plant, have been looking into the possibility of running an electric generator at the crematory and feeding the current into the electric lighting system of the city. In reply to a letter from Mr. Aird, the superintendent writes: "In regard to the possibility of generating electric current at the city cremator with a properly equipped plant and utilizing the current at the city electric light station, I see no reason why this cannot be done successfully here, as it has been accomplished in other places. Even if there should be any trouble at any time in synchronizing the generators, the current from the cremator could be used direct on the street lighting circuits to the full extent of the capacity of the generator. As the current could be utilized in this way, the question of running the machines in parallel could be entirely eliminated from the question of utilizing the current that could be generated at the city cremator. The cost last year of generating current measured at the switchboard, based on the total station expenses, was .0196 cents per kw. I see no reason why any steam that could be generated at the city cremator should not be utilized in the way you propose."

RAPID TRANSIT

Street Car Company Refuses to Issue Transfers

Seattle, Wash.—General Manager E. E. Potter, of the Seattle Electric Company, has issued a general order to his conductors to refuse to issue transfers on transfers on any line except the James street cable between First avenue and Broadway. Under this order every passenger who rides on more than two lines operated by the company, unless it shall be the James street line, will be required to pay two fares. Superintendent of Public Utilities A. V. Bouillon has been beseiged by patrons protesting against the new order, and the protestants became so insistent that he conferred with Corporation Counsel Scott Calhoun, who agreed with him that the order is in direct violation of its franchise.

Overcrowding Street Cars

Washington, D. C.—At a meeting of the District Electric Railway Commission, Secretary Eddy reported that he had learned in connection with his investigation of the subject of overcrowding street cars that the United Traction Company, running out of Albany, N. Y., of its own volition, has limited the number of passengers that may be carried in its cars at one time. The Third Avenue line in New York City has a regulation to the same effect, which requires a sign reading "Full" to be shown on the car when the prescribed number of passengers are aboard; and also that a resolution has recently been introduced in the City Council of Cleveland, Ohio, which limits the number of standing passengers to 50 per cent of the seating capacity of the car and restricts the number of those who are permitted to stand on the platforms. A new type of pay-as-you-enter car, with cross seats and a seating capacity of 34 passengers, is being tried on the Fourteenth street line. The car has 12 transverse seats, with short longitudinal seats at the end. The Chevy Chase line is operating several large new summer cars of the yellow type of the Fourteenth street line equipped with air brakes, in conformity with the recent regulation adopted by the Interstate Commerce Commission on recommendation of the District Commission.

MISCELLANEOUS

Awning Level Readjusted to New Hats

Wheeling, W. Va.—Because the low-hanging awnings of Wheeling streets cause embarrassment to the "waste-basket" style of headgear in vogue this season, Col. J. H. Devore, a member of the City Council, has persuaded the Board of Public Works to proceed with the measurement of the awnings and cause them to be elevated if necessary. The awnings were no trouble last year, when the flat "merry widows" were the rage, but recently the complaints have been many and highly strung, to such an extent that the gallant Colonel was moved to act. As he stands six feet three himself, he has incidentally run counter to the awnings, but he makes a special plea for the fair sex on the ground that they deserve consideration because the new city charter denies them the right of suffrage.

Plumbing Ordinance Ready

Dallas, Tex.—Thirty pages, vest-pocket size, with illustrations, make up the booklet bound in light pasteboard containing the plumbing ordinance of the city of Dallas. City Plumbing Inspector Jacob Boll has these ready for distribution to the contractors and declares that there will now be no excuse for any failure to comply strictly with the requirements. "I want especial attention called to Sec. 24," Mr. Boll said, "for it is a way in which the owners of buildings can see to it that the contractors comply with the specifications." The section referred to is as follows: "When the plumbing in a building is completed, the plumber, or his representative, shall secure for the owner of such building from the plumbing inspector, a certificate of inspection signed by the inspector, certifying that said work has been tested as provided by law."

Shade Tree Commission Saves Trees

Newark, N. J.—An idea of what may be accomplished in saving of shade trees is shown in the illustrations, showing a method employed by the Newark Shade Tree Commission. The scheme is to save the roots of a tree when it is necessary to remove the earth to a level below the place where the tree trunk ends. The ear, in some instances, may be left and it will be so densely sodded in a short time that the roots are safe. But on a city street the moving wheels of vehicles are quite apt to cut up the sod and earth so it is soon removed and the roots laid bare. That is what the wall of cement does in this particular instance. It holds the earth over the tree roots firmly in place so that not even the rain can do much harm. The good work of the Commission is having its effect and citizens are beginning to appreciate its efforts.

TREE, SAVED BY BANK OF EARTH AND SOD

Auto Tax Hard to Collect

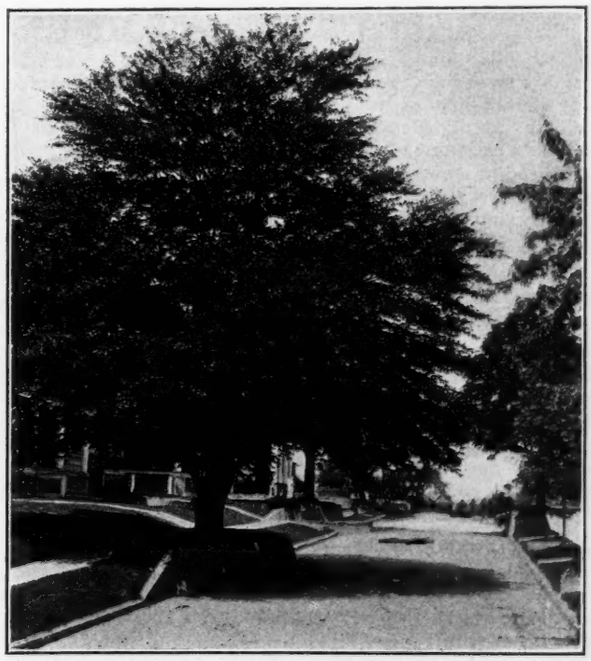
Washington, D. C.—Only by suit in court against each individual owner of an automobile can the annual automobile wheel tax provided in the last District appropriation be collected, according to an opinion of Assistant Corporation Counsel F. H. Stephens, submitted to the Commissioners. Of course, suit will not be necessary where owners pay voluntarily. There are about 3,000 automobile owners in the District of Columbia. If all should refuse to pay the tax 3,000 suits would be necessary. But Mr. Stephens thinks that after a few of the cases have been decided in favor of the District and the owners see they must hire a lawyer for a fight in court the tax will be generally paid voluntarily. At the next session of Congress, Mr. Stephens said, additional legislation will probably be recommended so that some means besides individual suits in the courts will be provided for enforcing this tax.

Athens to be Remade

Athens, Greece.—Athens, historic capital of grace and beauty, is to be remade in Germany. Herr Ludwig Hoffmann, architect of the city of Berlin, has been commissioned to map out a scheme for the architectural regeneration of the ancient Greek metropolis. He has just returned from a visit of inspection to Athens. The local authorities, with whom he conferred, appear to desire to remodel the city upon modern European lines with a system of parks, boulevards and public buildings, which will combine to make it more attractive as a tourist center. This Herr Hoffmann hopes to accomplish, while still retaining the best examples of ancient classic architecture, of which Athens contains a multitude. One of the projects upon which the Berlin builder frowned was what he describes as a "bizarre, fantastic creation, designed to perpetuate Greek heroism"—a design for a monumental statue submitted by an Italian sculptor. Although the design has already received first prize from the Athens Municipal Council, Herr Hoffman hopes to induce it to abandon the idea.

City Plan Leaves Factories in Suburbs

Augusta, Ga.—The City Extension Committee is unanimous in a decision that all territory south of the city and lying by the side of the belt line along Turpin Hill be left outside of the city limits. This has been done on account of the number of new industries that are proposed for that section, and as there is a State law against municipalities making the industries exempt from taxation, the only way to get the industries and not charge them a city tax is by the lines of the city being so run as to leave them outside.



TREE, SAVED BY CONCRETE WALL

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Allowance of Claim—Reconsideration

State ex rel. Minden Edison Electric Light and Power Company vs. City of Minden et al.—The Mayor and Council of a city of the second class under 5,000 inhabitants, if not restricted by any rule adopted by them, may reconsider their action in allowing a claim against the city at any time before the claimant has, in reliance upon their action in allowing such claim, changed his position to his own disadvantage. Section 80 of the charter act of cities of the second class under 5,000 inhabitants, providing that costs shall not be recovered in an action against the city upon an unliquidated claim unless the same is first presented to the Mayor and Council for audit, does not operate to make their action upon such claim judicial, nor to give their decision the effect of a judgment.—Supreme Court of Nebraska. 120 N. W. R., 914.

Reconstructing and Repairing Macadam

Jones et al. vs. Plummer.—The revised statutes as amended provides that on repairs of macadamizing the street shall be divided into sections, the cost in each section to be assessed on the lots fronting on either side of the section. Held, that the mere employment of the word "macadamizing" not essentially involving the idea of constructing a new stone foundation therefor, where the macadamizing on a stone foundation, permitted to remain intact, was completely removed and relaid, it was reconstructed within the statute, and not merely repaired, and hence a division of the street into sections was not necessary.—St. Louis Court of Appeals. 118 S. W. R., 109.

Police Power—Gambling

Town of Marksville vs. Worthy et al.—Playing cards for money has not been denounced as unlawful by the statutes of this State, except when such gambling is carried on in or in view of a public highway or street. A town charter which contains no delegation of power to suppress gambling, but confers merely the right "to remove nuisances," does not warrant the enactment of an ordinance penalizing the playing of cards for money in any and all places within the corporate limits.—Supreme Court of Louisiana, 49 S. A. R., 11.

Moving Buildings—Making Alterations

Hurwitz vs. Moore, Superintendent of Buildings, et al.—The permission of the President of the Borough of Brooklyn to move buildings through highways in accordance with a city ordinance and the permission of the Superintendent of Buildings of the borough to make alterations in the building are independent; and one obtaining a permit to make alterations cannot move the building over the highways, and one obtaining a permit to move the building over the highways cannot make alterations without obtaining a permit from the Superintendent of Buildings.—Supreme Court of New York, 116 N. Y. S., 248.

Assessment—Public Property

City of La Grange vs. Troup County.—Where an act of the General Assembly gives a general power to municipal authorities to assess against the property abutting on streets improved a specified percentage of the cost of such improvements, providing for the collection of such assessment by a levy and sale of the property assessed, and there is no provision clearly authorizing such assessment against public property, there is an implied exemption of the property of the county from such assessment.—Supreme Court of Georgia, 64 S. E. R., 267.

Street Paving—Selection of Materials

Glennon vs. Gates.—Where there are several kinds of vitrified bricks equally well suited to use for paving, the selection by the Board of Public Works of the bricks of a particular manufacturer, thereby cutting off all opportunities for the manufacturers of other kinds of vitrified bricks to submit bids, as provided by the city charter, is illegal.—Kansas City Court of Appeals. 118 S. W. R., 98.

Chicago Wheel Tax Ordinance

Ayres et al. vs. City of Chicago.—Act July 1, 1907, regulating automobiles and motor vehicles within the State, constituted a complete law, designed to suspend all municipal ordinances or rules regulating the equipment and operation of motor vehicles, and hence abrogated all municipal ordinances designed to regulate their use, and deprived municipalities of the right to pass regulating ordinances in the future. The Chicago wheel tax ordinance, requiring all persons owning automobiles or motor vehicles with seats for two or more persons to pay a license tax, was a revenue measure authorized by city and village act as amended, providing that cities may tax wagons and other vehicles conveying loads on public streets and alleys in cities and villages, etc., and was not regulatory, and not therefore in violation of Motor Vehicle Law, providing that no owner of a motor vehicle who shall have obtained a certificate from the Secretary of State as therein provided shall be required to obtain any other license, or permit to use the same, etc. The Chicago wheel tax ordinance requires owners of automobiles to obtain a license or permit to use the vehicles in the city, in addition to the license or permit obtained from the Secretary of State, as required by the motor vehicle law. Held, that the word "license" in such ordinance was used in the sense of tax, and that the issuance of the license thereunder amounted to no more than the giving of a receipt showing that the annual tax imposed by the ordinance had been paid. A bill attacking the Chicago wheel tax ordinance, taxing automobiles with seats for two or more persons, on the ground that it was unconstitutional for non-uniformity because single passenger automobiles were not taxed, alleging that such automobiles "have been, and are now, operated on the streets, avenues and alleys of the city," was not an averment that such automobiles were so operated when the ordinance was pased; and, the averment being construed more strongly against the pleader, the ordinance would be considered on the theory that there were no such machines then in use. If the Chicago wheel tax ordinance was valid when passed, it could not be rendered invalid by the subsequent introduction of a new class of vehicles not included within its terms.—Supreme Court of Illinois, 87 N. E. R., 1073.

Annexation—Liability for Old Debts

Walker vs. City of Rome.—Where two municipal corporations are consolidated and the new corporation receives assets of value, or where one municipality absorbs another and receives property and cash which is liable for the payment of the debts of the absorbed and dissolved corporation, the absorbing municipality becomes liable, at least to the amount of the assets it receives, for such pre-existing debts.—Court of Appeals of Georgia, 64 S. E. R., 310.

Assessment Benefits—Railroad Right of Way

New York Bay Railroad Company vs. City of Newark.—A railroad's right of way is regarded, for purposes of assessment for benefits, as land permanently devoted to public uses. Hence, benefit to the land in such use, not the enhancement of its market value, is the proper basis of its assessment. Where no such benefit accrues, no assessment can be imposed.—Supreme Court of New Jersey. 72 A. R., 455.

Personal Injuries—Sufficiency of Notice

King vs. City of Spokane.—Where a charter required a claim for injuries to be filed one month after such an injury a claim filed January 25, 1905, by mistake, stating the injury to have been received December 27, 1905, instead of 1904, was sufficient, since, in view of the provision requiring a notice to be given within a month the Council could know with reasonable certainty that December 27, 1904, was the date intended.—Supreme Court of Washington. 100 P. R., 997.

Improvement—Drainage

Gleason vs. City of Kirksville—To hold a city liable for grading a street by a fill with insufficient culverts, and thereby obstructing the flow of surface water, it is necessary to show that the work was directed by an ordinance of the city. One not originally responsible for the erection of a nuisance is not liable for its continuance, in the absence of notice or request to abate it.—Kansas City Court of Appeals. 118 S. W. R., 120.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals

It is our purpose to give in the first issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article; except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS

Road Construction, Curves, Gradients and Camber. By H. T. Wakelan. Illustrated, 3 pp., Contract Journal, May 12. 20 cts. 5 pp., Surveyor, May 11. 20 cts.

Construction and Maintenance of Roads. Paper before County Council's Association. By A. D. Greatorex. 1-2 p., Contract Journal, May 12. 20 cts.

Construction and Maintenance of Roads, Wear and Tear, etc. By W. N. Blair. 1 p., Contract Journal, May 5. 20 cts.

Construction and Maintenance of Roads. Paper before County Council's Association. By H. E. Stilgoe. 2-3 p., Contract Journal, May 12. 20 cts.

Construction and Maintenance of Roads. Paper before County Council's Association. By G. A. Philips. 2-3 p., Contract Journal, May 12. 20 cts.

The Future Road—the Wearing Surface. Paper before International Road Congress. By P. W. Henry. 3 pp., Good Roads, May. 10 cts.

Homogeneous "Double-Sealed" Road Construction. By Frank Latham. 1 p., Surveyor, April 23. 20 cts.

Road Maintenance. By F. G. Carpenter. 1 p., Contract Journal, May 5. 20 cts.

Road Maintenance and Automobiles. Experiences of Massachusetts Highway Commission. 1-3 p., Engineering Record, May 22. 10 cts.

Road Treatment Work of the Massachusetts Metropolitan Park Commission in 1908. 2-3 p., Engineering-Contracting, May 19. 10 cts.

Systematic Patching of Macadamized Roads. Paper before County Council's Association. By J. S. Pickering. 1-2 p., Contract Journal, May 12. 20 cts.

Crushing Stone for Street Work, Low Cost of. By W. A. Gillette. Illustrated, 2-3 p., Engineering-Contracting, April 28. 10 cts.

Highway Improvements in Missouri. 2-3 p., Engineering Record, May 8. 10 cts.

Road Conditions in Minnesota. From paper before State Automobile Association. By G. W. Cooley. 1 1-2 pp., Good Roads, May. 10 cts.

Roads of Richmond County, Georgia. By M. O. Eldridge. Illustrated, 1 p., Good Roads, May. 10 cts.

Roads Conference in London. Abstract of papers. Illustrated, 4 pp., Municipal Journal, May 7; 4 pp., May 14. 15 cts.

Practical Road Talk. By A. S. Brainard. Illustrated, 9 pp., Cornell Civil Engineer, May. 20 cts.

Experiments in Road Treatment in Massachusetts. Illustrated, 1 1-2 pp., Good Roads, May. 10 cts.

Experimental Road Work by the Massachusetts Highway Commission in 1908. 4 pp., Engineering-Contracting, May 5. 10 cts.

Illinois Experimental Macadam Roads. Illustrated, 3 1-2 pp., Good Roads, May. 10 cts.

Some Recent Experiments by the Office of Public Roads. 1 1-3 pp., Engineering Record, May 22. 10 cts.

Experiments in Road Treatment. Report of tests made of various binders by the Department of Agriculture. 2 1-2 pp., Municipal Journal and Engineer, May 26. 10 cts.

Some Experiments on the Resistance of Pavements. By A. C. D. Blanchard. Illustrated, 3 pp., Canadian Engineer, May 7. 10 cts.

Theory of Economic Road and Street Design and Location. 1 p., Engineering-Contracting, May 5; 1 p., May 12; 1 1-2 pp., May 19. 10 cts.

Traffic on Seven Typical Highways in Rhode Island, Analysis of. Paper before American Association for the Advancement of Science. By A. H. Blanchard. 2 1-2 pp., Engineering-Contracting, May 12. 10 cts. 1 1-2 pp., Engineering News, April 29. 15 cts.

Vehicles, Mutual Relation of Roads and. By R. E. B. Crompton. Contract Journal, May 12. 20 cts. 1 1-2 pp., Surveyor, May 14. 20 cts.

Wear and Tear of Motor Traffic on Roads. Paper before County Council's Association. By W. J. Taylor. 2-3 p., Contract Journal, May 12. 20 cts.

Cost Per Mile, Per Cent of Engineering Expenses and Bidding Prices on State Aid Roads in New Jersey in 1908. 2 pp., Engineering-Contracting, April 28. 10 cts.

True Solution of the Good Roads Problem Is the Just Distribution of the Burden of Cost. Paper before Ontario Good Roads Association. By J. F. Deam. 2 pp., Municipal World, May. 10 cts.

Legislation, New Road. 2 pp., Good Roads, May. 10 cts.

Crossing Gate, Automatic Road. By J. B. Van Bussel. 2-3 p., Engineering News, May 20. 15 cts.

Grass Sides of Roads, Treatment of the. Paper before County Council's Association. By Lord Leigh. 1-2 p., The Surveyor, May 14. 20 cts.

Vandalism, Highway. Paper before County Council's Association. By Rev. Canon Rawnsley. 1 1-2 pp., The Surveyor, May 14. 20 cts.

Concrete Roadways. Paper before Association of American Portland Cement Manufacturers. By C. W. Ross. 5 1-2 pp., Good Roads, May. 10 cts.

New French Concrete Pavement. 1-3 p., Municipal Journal and Engineer, May 26. 10 cts.

Wood Pavements in Paris and in American Cities. Blocks in Paris not generally creosoted, no sand cushion used. Recent American specifications. New York pavements. 2 pp., Municipal Journal and Engineer, May 12. 10 cts.

Asphalt, Testing. General consideration as to the value of previous investigation and direction of future ones. By Harry Tipper. 1 1-2 pp., Municipal Journal and Engineer, May 12. 10 cts.

Standardizing Tests of Bituminous Materials. By W. W. Crosby. 1 p., Good Roads, May. 10 cts.

San Francisco Asphalt Plant. Record of cost of operation. 1-2 p., Municipal Journal and Engineer, May 26. 10 cts.

Causes and Prevention of Defects in Asphalt Pavements. By I. Van Trump. 2 pp., Municipal Engineering, May. 25 cts.

Road Binders, Controlling the Consistency of Bituminous. By C. N. Forest. Illustrated, 1 p., Engineering Record, May 1. 10 cts.

Use of Asphaltic Flux for Coating Macadam Roads at Palo Alto, Cal. By J. F. Bixby, Jr., 1-2 p., Engineering News, May 13. 15 cts.

SEWERAGE AND SANITATION

Sewerage Statistics. Tabulated by Committee of the Sanitary Section, Boston Society of Civil Engineers. 4 pp., Journal Association of Engineering Societies, March. 30 cts.

Sewerage and Sewage Treatment in the United States. Data recently collected, describing methods of sewage treatment, if any, methods of ventilating sewers, use of catch basins and amount and sizes of vitrified and concrete sewers. 5 pp., Municipal Journal and Engineer, May 5. 25 cts.

Sewerage of East St. Louis. Gravity outlet with pumping during high water. Description of pumping station and machinery. Concrete sewers, plain and reinforced. Illustrated, 5 pp., Municipal Journal and Engineer, May 5. 25 cts.

Louisville Sewerage Improvements. By R. DeL. French. Illustrated, 3 pp., Engineering Record, May 1. 10 cts.

College Avenue Sewer, Indianapolis, Ind. By D. V. Moore. Illustrated, 3 pp., Municipal Engineering, May. 25 cts.

Sewer Construction in Clinton, Iowa, Methods of. By C. P. Chase. 6 pp., Municipal Engineering, May. 25 cts.

Steam Shovel in Louisville Sewer Construction. By F. C. Perkins. Illustrated, 1 p., Municipal Engineering, May. 25 cts.

Sewers at Cairo, Ill. Drainage necessary on account of ground water. Concrete trunk sewer, most of it without reinforcement. Some construction details. Illustrated, 2 pp., Municipal Journal and Engineer, May 5. 25 cts.

Reinforced Pipe in Wilmington. Concrete pipe reinforced with expanded metal. Methods and cost of construction. By Alex. J. Taylor. Illustrated, 2½ pp., Municipal Journal and Engineer, May 12. 10 cts.

Some novel methods of Sewer and Street Construction on Reclaimed Land. From paper before Canadian Society of Engineers. By G. L. Watson. Illustrated, 1 1-3 pp., Engineering Contracting, May 5. 10 cts.

Concrete Sewers at Richmond, Ind. Experience with reinforced pipe and monolithic reinforced concrete. Methods of construction and detailed costs of same. By Fred. R. Charles. Illustrated, 3 pp., Municipal Journal and Engineer, May 5. 25 cts.

Reinforced Concrete Block Sewer. Constructed in Bath, Me. Molded in four segments. Methods of construction and laying. Difficult construction in wet trench. By Stephen Litchfield. Illustrated, 2½ pp., Municipal Journal and Engineer, May 5. 25 cts.

Cost of Concrete Pipe. Data from a number of cities. ½ p., Municipal Journal and Engineer, May 5. 25 cts.

Cement Sewer Pipe. Experience of a large number of cities. 1½ pp., Municipal Journal and Engineer, May 5. 25 cts.

Brick and Cement Pipe Sewers of Manistee. By Jos. E. Craig. 2-3 p., Municipal Journal and Engineer, May 5. 25 cts.

Culvert Construction, Relative Economy of. From paper before Engineering Association of the South. By E. W. Cooper. 2 pp., Canadian Engineer, April 30. 10 cts.

Culvert and Sewer Design with Special Reference to Reinforced Concrete. Paper before Illinois Society of Engineers and Surveyors. 3 1-3 pp., Engineering Contracting, May 5. 10 cts.

Siphon, Inverted Sewer. Illustrated, 1 p., Municipal Journal and Engineer, May 12. 10 cts.

Catch Basins, The Use of. Arguments for and against their use. 2-3 p., Municipal Journal and Engineer, May 5. 25 cts.

Ventilation of Sewers. 1-2 p., Municipal Journal and Engineer, May 5. 25 cts.

Ventilation of Sewers. 1-2 p., Municipal Engineer, April 23. 10 cts.

Pumping of Sewage. Brief statements of methods and mechanism employed in more than 30 cities. Both centrifugal and displacement pumps used. 1 p., Municipal Journal and Engineer, May 5. 25 cts.

Sewage Pumping at Waltham. Sewage from 30 acres lifted 30 feet by automatic electric pumps. Satisfactory operation. By Bertram Brewer. Illustrated, 2 pp., Municipal Journal and Engineer, May 5. 25 cts.

Salt Lake City Sewage Outlet and Pumping Plant. Twenty-four-inch wood stave outlet sewer. Centrifugal pumps, electric motor and producer gas plant of 150 horsepower. Plant now nearing completion. By Louis C. Kelsey. Illustrated, 4 pp., Municipal Journal and Engineer, May 5. 25 cts.

Sewage Works of the Future. By J. C. Thresh. Paper before Association of Managers of Sewage Disposal Works. 1 1-2 pp., Surveyor April 30. 20 cts.

Sewage Disposal at Columbus. Detailed description of the plant recently completed. By E. A. Kemmler. Illustrated, 10 1-2 pp., Municipal Journal and Engineer, May 5. 25 cts.

Lake Forest Sewage Disposal. Septic tank, dosing chamber and 10 filter beds. Plant allowed to deteriorate. Official analyses showing degree of purification. Illustrated, 2 pp., Municipal Journal and Engineer, May 5. 25 cts.

Ilford Sewage Disposal Works. Paper before Association of Managers of Sewage Disposal Works. By Herbert Shaw. 1 1-2 pp., Contract Journal, April 28. 20 cts. Illustrated, 2 pp., Surveyor, April 30, 20 cts.

Practical Sewerage and Sewage Disposal. By H. C. H. Shenton. 1-3 pp., Local Government Journal, May 8. 10 cts.

Fundamental Principles of Sewage Purification on Land. Distribution, etc. By Rudolph Hering. 3 1-2 pp., Engineering News, May 6, 27. 15 cts.

Disposal of Chicago's Sewage. Organization of sanitary district—Drainage Canal figures—Reconstruction of city's sewerage system—Power development by Sanitary District Commissioners. Illustrated, 3 1-2 pp., Municipal Journal and Engineer, May 19. 10 cts.

Sewage Purification Works at Mount Vernon, N. Y. By G. L. Robinson. Illustrated, 2 pp., Engineering News, April 29. 15 cts.

Sewage and Brown Coal as Fuel. By R. W. Rogers. 2-3 p., Power, May 11. 5 cts.

Sewage Disposal. From report of Royal Commission. 1 1-2 pp., Canadian Engineer, May 7. 10 cts.

Principles of Sewage Purification. Lecture delivered at Cornell University. By George W. Fuller. 3 1-2 pp., Engineering Record, May 22. 10 cts. 2 1-3 pp., Engineering Record, May 15. 10 cts.

Sewage Treatment at Bloomington. Settling tank, combined dosing chambers and contact beds, percolating filters and sedimentation basin; novel arrangement of units; cost of plant. By George L. Thon. Illustrated, 4 pp., Municipal Journal and Engineer, May 5. 25 cts.

Recent Researches on Sewage Purification. By Sidney Barwise. 12 pp., Journal Royal Institute of Public Health, May. 60 cts.

Growth of the Sewage Disposal Idea. By Alexander Potter. 2 pp., Municipal Engineering, May. 25 cts.

Septic Tank Patent Decision. Discussion of legal points of the Saratoga decision, with special reference to plant at Princeton, N. J. Oxygen and sludge equilibrium essential. 1 1-2 pp., Municipal Journal and Engineer, May 5. 25 cts.

Study of the Discharge of Septic Tank Sludge into a Tidal Estuary. From report by Dr. G. J. Fowler, in the British Royal Commission's Report on Sewage Disposal. 1-2 p., Engineering News, April 29. 15 cts.

Report on Illinois Septic Tanks. 1-2 p., Municipal Journal and Engineer, May 12. 10 cts.

Fundamental Principles of Sewage Purification on Land. By Rudolph Hering. 3 pp., Engineering News, May 6. 15 cts.

Sanitation of Manila, The White Man's Burden in the. From report of Governor-General J. F. Smith. 1-2 p., Engineering News, May 6. 15 cts.

Circular Letters Issued by Order of the Indiana State Board of Health. 2 pp., Bulletin, State Board of Health, March. 10 cts.

Milk Supply. By Duncan J. Mackenzie. 5 pp., Journal Royal Institute of Public Health. May. 60 cts.

Bovine Tuberculosis and Its Eradication. By W. B. De Vine. 6 pp., Journal Royal Institute of Public Health, May. 60 cts.

Typhoid Statistics in Washington. Comment on difficulty of obtaining correct figures. 1-3 p., Municipal Journal and Engineer, May 19. 10 cts.

Relation of Pollution of Water to the Transmission of Water-Borne Diseases, 4 pp., Bulletin, New York Department of Health, April. 10 cts.

WATER SUPPLY

Water Supply. Paper before Union of Alberta Municipalities. By Prof. Muir Edwards. 2 pp., Canadian Municipal Journal, May. 10 cts.

Water Works System of Winnipeg. 2-3 p., Fire and Water, May 5. 10 cts.

Llandudno's Water Supply. Illustrated, 1 p., The Municipal Journal, April 30. 15 cts.

Cowlyd Water Works. Description of the undertaking. Illustrated, 1 3-4 pp., Surveyor, April 23. 20 cts.

Battle Creek (Mich.) Water Works. 2 pp., Water and Gas Review, May. 20 cts.

Brief History of Detroit Water Works. Illustrated, 2 1-2 pp., Fire and Water, April 28. 10 cts.

Water Works of Port Elizabeth, South Africa. 1-2 p., Engineering Record, May 8. 10 cts.

Works of the Derwent Valley Water Board. By Edward Sandeman. 11 pp., Journal Royal Institute of Public Health, May. 60 cts.

Water Works Notes from Madison, 1-2 p., Municipal Journal and Engineer, May 12. 10 cts.

Water Supply Anomalies in New York City. Communication from J. H. O'Brien. 1-3 p., Engineering News, April 29. 15 cts.

Well Records, Correlation of Deep. Paper before Illinois Water Supply Association. By J. A. Uden. 1 p., Fire and Water, May 12. 10 cts.

Automobile Used for Testing Well. Illustrated, 1-2 p., Municipal Journal and Engineer, May 26. 10 cts.

Reservoirs for New York Water Supply. Illustrated, 1 p., Fire and Water, May 12. 10 cts.

Great London Reservoir. Illustrated, 2 pp., Municipal Journal, May 7. 15 cts.

Completion of Cobbs Hill Reservoir. Illustrated, 1 p., Fire and Water, May 12. 10 cts.

Forestry Operations About the Wachusett Reservoir, 1 p., Engineering Record, May 15. 10 cts.

Stream Gaging in the West. By W. B. Freeman. Illustrated, 10 pp., Cornell Civil Engineer, May. 20 cts.

Pumping Stations, Designing of Modern Water Works. By E. R. Matthews. Illustrated, 3 pp., Surveyor, April 23. 20 cts.

Tests of Electro-Turbine Pumping Plant at Lockport, N. Y. 1-3 p., Engineering Record, May 8. 10 cts.

Aqueduct, The Los Angeles. Illustrated, 2 pp., Cement, April. 25 cts.

Water Tower, Reinforced Concrete. Illustrated, 1 p., Cement World, May. 15 cts.

Unique Water Tower. By E. T. Bailey. Illustrated, 2 pp., Municipal Engineering, May. 25 cts.

General Specifications for the Design of Elevated Tanks and Standpipes. Paper before American Society of Civil Engineers. By C. W. Birch-Nord. 1 p., Engineering Contracting, May 12. 10 cts.

Hydraulic Gate Valves for Chicago Water Works. Illustrated, 1 p., Engineering News, May 13. 15 cts.

Pipe, Well Preserved Cast-Iron. Illustrated, 1-2 p., Municipal Journal and Engineer, May 12. 10 cts.

Electrolysis of Water Mains at New Bedford. 1-2 p., Engineering Record, May 15. 10 cts.

Storage of River Waters. 2 1-2 pp., Canadian Engineer, April 30. 10 cts.

Purification Effects on Waters by Storage. By A. C. Houston. 3 pp., Canadian Engineer, April 23. 10 cts.

Benefits of Water Storage. 1-2 p., Engineering Record, May 1. 10 cts.

Purification Plant, Work of the Cincinnati. 1-3 p., Engineering Record, May 22. 10 cts.

Filters, Alternative Designs for Hand-Washed and Machine-Washed Slow Sand, Borough of Queens, N. Y. 1 p., Engineering News, May 20. 15 cts.

Water Filtration Plant at Ashtabula, O. Illustrated, 2 pp., Municipal Engineering, May. 25 cts.

Filters, Recent Upward Water, with special reference to Jerome Park Filter, New York City. Illustrated, 2-3 p., Engineering Record, May 15. 10 cts.

East St. Louis Water Treatment. Plain sedimentation, coagulation with lime and iron, filtration, effect of temperature on sedimentation and alkalinity. 1 1-2 pp., Municipal Journal and Engineer, May 12. 10 cts.

Water Purification at Alton. Sedimentation and Filtration in ten mechanical filters. Lime and iron sulphate used as coagulants. Illustrated, 1 1-2 pp., Municipal Journal and Engineer, May 26. 10 cts.

Double Water Filtration Experiments. Investigations of five systems of filtration conducted by the Massachusetts State Board of Health at Lawrence, Mass. 2-3 p., Engineering Record, May 22. 10 cts.

Practical Sterilization of Water and of Sewage Effluent. By H. C. H. Shenton. Paper before Institution of Municipal Engineers. 3 pp., The Surveyor, May 14. 20 cts. 4 pp., Contract Journal, May 5. 20 cts.

Water Softening at Oberlin, Ohio. 1 p., Engineering Record, May 8. 10 cts.

Rates for Water Service. By D. H. Maury. 4 pp., Midland Municipalities, May. 10 cts.

Meters in Germany, Use of Water. Consumption in cities with and without meters. 2-3 p., Municipal Journal and Engineer, May 19. 10 cts.

Resource, Water as a. By W. J. McGee. 14 pp., Annals of American Academy of Political and Social Science. May. $1.

The Scope of State and Federal Legislation Concerning the Use of Water. 17 pp., Annals of American Academy of Political and Social Science. May. $1.

STREET LIGHTING AND ELECTRIC POWER

Street Lighting in Chicago by Energy from the Drainage Canal. Illustrated, 1½ pp., Electrical World, May 20. 10 cts.

Lighting Rates in Small Central Stations. 1 p., Electrical Review, May 8. 10 cts.

Contracts for Public Lighting. 2/3 p., Engineering Record, May 22. 10 cts.

Theory and Practice of Illumination. By T. W. Rolph. Illustrated, 16 pp., Journal Franklin Institute, May. 50 cts.

Electricity and Conservation of Energy. Paper before American Institute of Electrical Engineers. By L. B. Stillwell. 16 pp., Proceedings, May. $1.

Lamps, Technics of Arc. 1 p., Electrical World, May 13. 10 cts.

Tungsten Street Lighting at Warren, O. By J. D. Hoit. Illustrated, 5 pp., Illuminating Engineer, May. 20 cts.

Standards, Atlantic City Lighting. By R. S. Edmondson. Illustrated, 3 pp., Municipal Journal and Engineer, May 12. 10 cts.

Electrical Installation of the city of Para, Brazil. By A. H. Bridge. Illustrated, 3 pp., Electrical Review, May 8. 10 cts.

Use of Large Gas Engines for Generating Electric Power. Paper before British Institution of Electrical Engineers. By Leonard Andrews and Reginald Porter. 2 1/3 pp., Water and Gas Review, May. 20 cts.

Power Costs in a 1250-kw. Central Station. By H. S. Knowlton. 1 p., Engineering News, April 29. 15 cts.

Construction and Equipment of Power Plant at Kenora, Ont. Illustrated, 3 pp., Contract Record, April 28. 10 cts.

An Exhaust Steam Turbine Installation at the 13th street power house of the Philadelphia Rapid Transit Company. By W. S. Twinning and W. C. Kerr. Illustrated, 7 pp., Power, May 4. 5 cts.

Transmission and Distribution of Electricity for Light and Power in Large Cities. From paper before Chicago Electric Club. By D. W. Roper. 1 p., Electrical Review, May 1. 10 cts.

Gas, Quality of. By A. D. Adams. 2 pp., Municipal Engineering, May. 25 cts.

FIRE AND POLICE

Fire Department of Springfield, Mo., Wretched. Report by E. R. Townsend. 1 p., Fireman's Herald, May 8. 5 cts.

High Pressure Water Supply of Winnipeg, Man. 1½ pp., Municipal Engineering, May. 25 cts.

Philadelphia High Pressure Service. Illustrated, 2/3 p., Fire and Water, May 19. 10 cts.

Waste of Resources Due to Fire. By C. W. Baker. 8 pp., Insurance Engineering, April. 25 cts.

GOVERNMENT AND FINANCE

Legislation, Municipal. Paper before Union of Alberta Municipalities. By H. H. Gaetz. 1½ pp., Canadian Municipal Journal, May. 10 cts.

Moving Picture Regulations. Reports from 115 cities. 21 pp., Insurance Engineering, April. 25 cts.

Charter for Berkeley, Cal., New City, and how it promises to work. ½ p., Engineering News, April 29. 15 cts.

Recall Election in Los Angeles. 3½ pp., Municipal Affairs, May. 10 cts.

Commission Government at Cedar Rapids, Ia. 1 p., Municipal Journal and Engineer, May 19. 10 cts.

Direct Primary. A New and Advancing Movement in American Politics. By Judson C. Welliver. 10 pp., Munsey's, May.

Regulation by Commission. By R. C. Dawes. 2½ pp., Progressive Age, May 1. 20 cts.

Control of Municipal Public Utilities. By R. O. Brown. 2 pp., Midland Municipalities, May. 10 cts.

Franchises, Their Value to the Public. Paper before Transportation Club of Toledo. By Albion E. Lang. 2 pp., Public Service, May. 20 cts.

Tammany's Control of New York by Professional Criminals. By George Kibbe Turner. Illustrated, 17 pp., McClure's, June.

Business Manager in Staunton, Va., Municipal. By E. S. Bradford. 2 pp., Municipal Engineering, May. 25 cts.

Financing Public Utilities. By W. H. Winslow. 2 pp., Public Service, May. 20 cts.

Profit Sharing in Public Utilities. By W. H. Winslow. 2 pp., Midland Municipalities, May. 10 cts.

Municipal Bond Sales During April. 1 p., Municipal Journal and Engineer, May 26. 10 cts.

Forms for Issue and Cancellation of Municipal Bonds. By E. R. Reilly. Paper before Union of New Brunswick Municipalities. 2 pp., Canadian Municipal Journal, May. 10 cts.

Appraising Property for Purposes of Taxation. A new field for engineers. 1/3 p., Engineering-Contracting, May 19. 10 cts.

Bookkeeping, Municipal. 1½ pp., Western Municipal News, May. 10 cts.

Collecting City Bills, System in. Accounting system of Logansport Electric Light Department. Card catalogue of subscribers. Forms of bills. Removal and discontinuance of meters. Illustrated, 2½ pp., Municipal Journal and Engineer, May 26. 10 cts.

TRAFFIC AND TRANSPORTATION

Street Railways, Pittsburg's. Report of State Railroad Commission by Stone & Webster. 1½ pp., Public Service, May. 20 cts.

Conditions of Electric Railway Operation in Mexico City. Illustrated, 9 pp., Electric Railway Journal, May 1. 10 cts.

Investigation of Street Railway Situation in Detroit. 2 pp., Electric Railway Journal, May 22. 10 cts.

Fares and Service. Hearing by Public Service Commission on Schenectady. 1 p., Electric Railway Journal, May 1. 10 cts.

Use and Abuse of Transfers. Paper before Arkansas Association of Public Utility Operators. By C. J. Griffith. 1 p., Electric Railway Journal, May 22. 10 cts.

Controversy over Abandonment of Tickets in Philadelphia. 1 p., Electric Railway Journal, May 15. 10 cts.

Center-Door Trains in New York Subway. Illustrated, 2 pp., Electric Railway Journal, May 1. 10 cts.

Tunnel, Ventilation of Washington Street, Boston, Mass. Illustrated, 1½ pp., Public Service, May. 20 cts.

Annunciator in Chicago, Street Car. Illustrated, ¾ p., Electric Railway Journal, May 15. 10 cts.

STRUCTURAL MATERIALS

Iron and Steel, the Protection of, from Corrosion. By W. H. Walker. 10 pp., Engineering Magazine, May. 25 cts.

Tests of Built-Up Steel and Wrought-Iron Compression Pieces. By A. N. Talbot and H. F. Moore. 42 pp., Proceedings American Society of Civil Engineers, April. 50 cts.

The Development and Use of Steel Sheet Piling; with some data on the preservation of steel buried in the ground. Paper before Technical League. By J. R. Wemlinger. 2 pp., Engineering-Contracting, May 19. 10 cts.

Concrete Aggregates. By Dr. J. S. Owens. 6 pp., Concrete, May. 35 cts.

Dangers of Breeze Concrete. By D. B. Butler. Paper before Society of Architects. 1½ pp., Surveyor, April 30. 20 cts.

Specifications for Sand and Stone for Concrete. 1/3 p., Engineering Record, May 1. 10 cts.

Effect of Changes of Temperature on Reinforced Concrete. By Dr. Fritz Von Emperger. Illustrated, 4 pp., Concrete, May. 35 cts.

Experiments on the Electrolysis of Reinforced Concrete. From paper before Engineers' Club of St. Louis. By A. S. Langsdorf. Illustrated, 1½ pp., Engineering-Contracting, Apr. 28. 10 cts.

Hints for Inspectors of Concrete Work. Illustrated, 1 p., Engineering-Contracting, April 28; Illustrated, 2 pp., May 12. 10 cts.

Cement, Action of Water on. 1 p., Municipal Journal and Engineer, May 12. 10 cts.

Use of Concrete in City Parks, New Orleans. Illustrated, 3 pp., Concrete, May. 15 cts.

Cast Reinforced Concrete Piles. Paper before Boston Society of Engineers. Illustrated, 19 pp., Cement, April. 20 cts.

BRIDGES

Designing, Bridge. Paper before Engineers' Club of St. Louis. By Carl Gayler. Illustrated, 10 pp., Journal Association of Engineering Societies, March. 30 cts.

Erection of Girder Bridges. By F. W. Skinner. Illustrated, 2 pp., Engineering Record, May 1. 10 cts.

Early Construction Methods on the Grand avenue, Milwaukee, Viaduct. Illustrated, 2 pp., Engineering Record, May 22. 10 cts.

Reinforced Concrete Arch Bridge Across the Illinois River at Peoria, Ill. Collapse of the. Illustrated, 3½ pp., Engineering News, May 13. 15 cts.

Sligo Reinforced Concrete Viaduct; a Highway Bridge in Takoma Park, Maryland. Illustrated, 2 pp., Engineering Record, May 15. 10 cts.

Combination Steel and Concrete Arch Bridge. Description of Plate Girder Bridge over Pennsylvania Railroad. Illustrated, 2 pp., Engineering Record, May 22. 10 cts.

The 42d street Bridge, Philadelphia, Pa. An arch with steel ribs filled between with concrete. Illustrated, 3 pp., Engineering News, May 20. 15 cts.

Reinforcing a Highway and Street Railway Bridge over the Housatonic River at Stratford, Conn. 1 p., Engineering Record, May 15. 10 cts.

Galen Street Bridge at Watertown, Mass. Illustrated, 2/3 p., Engineering Record, May 8. 10 cts.

MISCELLANEOUS

Street Cleaning Appliances. Chicago's record purchase of flushing machines. Cost of operation. Hand flushing appliances. California suction cleaner. Illustrated, 3 pp., Municipal Journal and Engineer, May 19. 10 cts.

Street Cleaning by Contract or Day Labor. ½ p., Municipal Journal and Engineer, May 26. 10 cts.

Day Labor as Compared with Contract Work, What Telford Said about. 1 p., Engineering-Contracting, May 5. 10 cts.

Public Works of Saskatchewan, Aims and Methods of the Department of. Paper before Saskatchewan Local Improvement District Association. By A. D. McPherson. 6 pp., Western Municipal News, May. 10 cts.

Baths, Croyden. Description of New Hall. Illustrated, 2/3 p., Municipal Journal, April 30. 15 cts.

Town Hall, Farnworth's New. Illustrated, 1 p., Municipal Journal, April 30. 15 cts.

Wrecking the Old City Hall in Chicago. Illustrated, 1 p., Engineering Record, May 15. 10 cts.

Municipal Piers in Baltimore Harbor, New. Illustrated, 3 pp., Engineering Record, May 8. 10 cts.

Bulkhead, Constructing a Braced-Pile, Borough of the Bronx, New York City. Illustrated, ½ p., Engineering Record, May 1. 10 cts.

Town Planning and Practice. Illustrated, 5 pp., Municipal Journal, April 16; Illustrated, 2 pp., April 30. 15 cts.

Town Planning Impressions. Views on continental town planning by leading members of the Housing Reform touring party. 2 pp., Municipal Journal, May 14. 15 cts.

Town Planning in Germany. 2 pp., The Municipal Journal, May 7. 15 cts.

Town Planning, The Visit to Germany. 1 1/3 pp., The Surveyor, May 14. 20 cts.

Municipal Art Exhibition. Account of exhibition in New York by the Municipal Art Society and the Committee on Congestion of Population. Illustrated, 3pp., Municipal Journal and Engineer, May 26, 10 cts.

Street Grades, Problems in. 1 p., Municipal Journal and Engineer, May 26. 10 cts.

Housing, Municipal. From paper before Royal Institute of British Architects. By W. E. Riley. 1½ pp., Surveyor, April 23. 20 cts.

Homes for Working Men. Aid by Government and manufacturers in Austria-Hungary. 4 pp. Daily Consular Reports, April 30. 10 cts.

Smoke Nuisance, Abolishing the. From Bulletin of the United States Geological Survey. ½ p., Engineering Record, May 22. 10 cts.

Chicago Smoke an Expensive Luxury. ½ p., Municipal Journal and Engineer, May 19. 10 cts.

Smokeless Combustion. Summary of Bulletin of the U. S. Geological Survey. ½ p., Progressive Age, May 15. 20 cts.

Purchasing Coal by Specification of Thermal Efficiency. 1/3 p., Engineering Record, May 8. 10 cts.

Boiler Waters, Technical Examination of. Paper before the Australasian Association for the Advancement of Science. By W. A. Hargraves and W. T. Rowe. 1 1/3 pp., Engineering News, May 20. 15 cts.

Conduits, Telephone. Paper before Canadian Independent Telephone Association. By G. Rakes. Illustrated. 1½ pp., Canadian Municipal Journal, May. 10 cts.

Caisson Disease and its Prevention. By Henry Japp. Illustrated, 21 pp., Proceedings, American Society of Civil Engineers, April. 50 cts.

Harbor Development at Chicago, Engineering, Commercial and Administrative Problems of. Illustrated, 2 pp., Engineering News, April 29. 15 cts.

Engineering as a Profession. Comment on address by Prof. G. F. Swain at the Harvard Union. 1 p., Engineering Record, May 15. 10 cts.

Relation of the Engineer to the Community. Paper before McGill Engineering Society. By C. B. Smith. 1 p., Canadian Engineer, April 23. 10 cts.

Are "Cost Data Merely Approximations Suitable for Rough Estimates"? ½ p., Engineering-Contracting, April 28. 10 cts.

Civic League, San Francisco's. ½ p., Municipal Journal and Engineer, May 26. 10 cts.

PATENT CLAIMS

922,386. APPARATUS FOR DISCHARGING LIQUIDS FROM AND TO FILTER-BEDS, etc. Charles R. B. Brown, London, England. Serial No. 430,361.

Apparatus for controlling the action of a siphon, comprising a chamber, a connection between said siphon and said chamber, a pipe circuit leading from and returning to said chamber, said pipe circuit being adapted to communicate with the atmosphere at one point, and a liquid adapted to circulate through said chamber and said pipe circuit partly under the action of the change of pressure in said siphon and partly under the influence of gravity for the purpose set forth.

922,493. ROAD-GRADING ATTACHMENT FOR VEHICLES. Winfield S. Livengood, Kansas City, Mo., assignor to Smith & Sons Mfg. Co., Kansas City, Mo. Serial No. 388,548.

The combination with the running gear of a wagon, of a removable frame mounted thereon, a scraper-blade suspended from said frame, means for pivotally securing the forward end of the removable frame to the running gear, and a retaining-plate for securing the rear end of said frame to the running gear.

922,636. GATE-VALVE. Anthony P. Smith, Newark, N. J.—Serial No. 231,184.

The combination with a valve seat and a gate valve movable edgewise across the seat to open and closing positions and also flatwise toward and from the seat, of an actuating member for imparting opening and closing movements to the valve, said member being adapted to move relatively to the valve, means whereby such relative movement of the actuating member in one direction causes the valve to move flatwise toward the seat and in the other direction permits it to move flatwise from the seat, locking means for preventing relative movement between the actuating member and the valve, means for moving said locking means into locking position as the actuating member starts on its opening movement and for moving said locking means into unlocking position as the actuating member approaches the end of its closing movement, and means for co-acting with said locking means for preventing edgewise opening movement of the valve from its closing position until the actuating member has been moved to permit the valve to move flatwise, substantially as described.

922,687. STREET-PAVEMENT. Samuel E. Finley, Atlanta, Ga. Serial No. 437,729.

A street pavement of the class described comprising blocks having registering openings or passages in their lower faces and ventilating tubes open to the atmosphere and arranged thereunder and having spaced lateral openings throughout their length registering with the passages in said blocks.

922,688. STREET-PAVEMENT. Samuel E. Finley, Atlanta, Ga. Serial No. 437,730.

A pavement comprising a foundation having its upper face provided with longitudinally spaced trough-like passages extending transversely across the pavement, similar passages arranged longitudinally of the pavement at opposite sides thereof and communicating with said transverse passages, a catchbasin arranged to receive the discharge from said longitudinal passages and blocks disposed on said foundation with their lower faces opposed to said trough-like passages and with said transverse passages extending centrally below the individual blocks.

922,907. GAS-LAMP. Alfred H. Humphrey, New York, N. Y. Serial No. 385,322.

In a gas lamp, the combination with a gas delivery pipe, of a chimney having an outwardly projecting flange at its lower end; an inverted main burner arranged through said flange with its tip below the same; a casing arranged about said chimney in a spaced relation therefrom, said casing being open at its upper end; a pilot burner arranged above said chimney flange with its tip within said casing, there being an opening through the wall of said chimney to admit the flashing flame of said pilot burner; means for supplying gas to said pilot burner for maintaining the same; and a valve adapted to control the delivery of gas to said main burner, said valve being adapted on the opening movement thereof to admit the gas to said pilot burner, whereby the same is flashed to ignite the main burner.

922,953. APPARATUS FOR PURIFYING THE AIR IN SUBWAYS. John Ring, St. Louis, Mo. Serial No. 398,414.

The combination, with a railway subway open at both ends and having the usual ventilating shafts and air outlets and in which the air has free ingress and egress and is drawn in, stirred up with the dust therein and expelled by the movement of the cars passing therethrough; of an air supply standpipe open at its upper end and extending to a sufficient height in the open atmosphere, an air compressor with which the standpipe connects, a conducting pipe leading from the air compressor, a cooling coil with which the conducting pipe connects, a series of drip pans for water located above the cooling coil, a catchbasin for the water located beneath the cooling coil, a conducting pipe leading from the cooling coil, a storage reservoir for the cooled and compressed air, with which the conducting pipe from the coil connects, receivers having controlling valves and connected with the storage reservoir, a main leading from the storage reservoir having a controlling valve, and a series of headers with which the main connects, provided with cut-off valves, expansion valves connected to the headers and expansion pipes connected with the expansion valves and having greater interior area than the ports of the expansion valves.

923,127. ELECTRIC-ARC LAMP. Ladislav O. Kozar, Wilkes-Barre, Pa., assignor of one-half to Joseph Murgas, Wilkes-Barre, Pa. Serial No. 484,032.

The combination with electrodes, of a dash-pot connected thereto tending to prevent the separation of the electrodes, a spring securing said dash-pot adapted to be placed under tension upon the movement of said electrodes toward each other.

NEWS OF THE SOCIETIES

National Congress on City Planning.—The first feature of the nine days' series of meetings, lectures and exhibitions at Washington, D. C., was a speech by President Taft at the new Masonic Temple, in which he endorsed the movement.

Henry Morgenthau outlined a "National Construction Programme for City Planning" as follows:

First, to stop the continued present use of the existing tenements by making still more stringent tenement house laws, and strictly enforcing them; have continued inspection to see that no one sleeps in rooms without windows; that every one has the required amount of cubic feet of air, which will stop the custom of having three or more boarders in the one family room.

Second, to have every city have a plan which will provide for its proper development along hygienic lines for the next fifty years; let them establish zones for their factories and for their residences and plenty of space for vacation, and see to it by strict laws that present conditions cannot be duplicated. Fortunately the Supreme Court of Massachusetts has shown us the legality of it. There is no limit to which the police and health powers cannot be extended.

Third, proper transit facilities. The way the various large cities' franchises have been given away and misused is a shame and a crime. The manipulators of the traction stock have criminally enriched themselves and have watered the stock and increased the burdens and fixed charges on the roads to such an extent that it is for the time being leaving many cities without the need of facility and blinding the issue. Yet it has been demonstrated that passengers can profitably be carried fifteen miles through well populated districts for 5 cents. There are no cities whose present population will not be larger in many years to come. Let the cities' authorities study the problem and provide properly for future needs. What do we think of an architect planning a twenty-story building on 20,000 feet of land and only providing two elevators instead of ten or twelve? And that is the present condition of the great metropolis of America. Let the city build its own subways and elevated roads; or permit private capital that is content with a moderate income on its actual investment to do so. Make the outlying districts accessible.

Fourth, restrict certain large sections to one and two family houses, so that the poor can have homes and all the advantages and none of the drawbacks of city life. To-day there are many thousands of acres within thirty minutes' reach of the heart of New York that can be bought for $1,500 an acre and less. It costs about $2,000 or $3,000 on an acre, according to the condition of the soil, to sewer, grade, sidewalk and curb them properly. As there are twelve lots to each acre the cost per lot will not be under $400. A family home can be secured for $2,000; the interest on the investment at 5 per cent will be $120 and the taxes about $25, and the monthly rent will not exceed $12. The people that live this way will be so much more efficient as workers that the factories will follow them and the problem will be nearing its solution.

Benjamin C. Marsh, secretary of the national committee, in his address, spoke in favor of the enactment of police regulation on tenement inspection along the lines of those employed in Vienna and Berlin. There the police enter tenements at any hour of the day or night, and if they find them overcrowded summon the offenders into court. Immigrants from foreign cities to America, in the opinion of Mr. Marsh, would easily fall into this custom, as they are accustomed to it in Europe.

Franklin MacVeagh, Secretary of the Treasury, presiding officer of the conference, said that the United States has the responsibility of making Washington the model city of the nation. He said that bad housing conditions have resulted from the one defect in the city plan for the Federal capital and that the movement for city planning in general should be directed less along the lines of providing automobile driveways and bridle paths in the outskirts and more to the cleaning up of congested centers of population where disease, vice and crime breed.

Mrs. Simkhovitch said about city congestion that there are two programmes. These she designated as 'the long distance" and "the short distance." Outlining them, she said: "Our long-distance programme involves: First, the purchase or control of land outside of cities, insuring lower rentals and either nearness to work or else a rapid, very cheap transit. This involves, of course, a scientific city plan. Second, the furnishing of city advantages to suburbs and country communities. Third, the gradual restriction of the number of persons living on a given area, which involves limiting the height of houses and the introduction of adequate inspection.

"Our short-distance programme is not so terrifying in magnitude, but it's a good five-year job. It involves: First, an educational campaign to bring about a city plan for every city and growing community in the United States. Second, cooperation with industrial removal societies and all private and public bureaus for the removal from city to country, and an organized opposition to the habit of charitable persons and societies of supplying money for rent to enable families to remain in the city. Third, the appointment of a national commission to consider and report upon the entire subject."

The exhibit portrayed in most significant manner the fact that sickness is a tremendous expense to the community, and that the endeavor to secure good housing conditions for the entire citizenship of a city is not a fad nor an ism, but a good business proposition. Bad housing means sickness, sickness means lack of employment; that means that a poor family has to be supported by some one.

A striking map, 10 x 14 feet, of Liverpool shows not only geographic boundaries, but in each ward the death rate is shown, as well as the density of population per acre, the birth rate and the infantile death rate; showing clearly and locating directly some of the responsibility for the high death rates which have alarmed Liverpool and forced its municipal government into its progressive and sane method of housing. Adjoining this map were photographs showing the houses being erected for the accommodation of the working people.

Diagrams showing the present tenement house laws in various cities emphasize that they are robbing the poor of sunlight. Not only New York City, but Cleveland, Chicago, St. Louis and most large American cities have very bad tenement house laws. The exhibit also contained a striking series of placards showing the result of certain features of congestion.

From beginning to end the city planning exhibit showed that congestion, with all its attendant evils, is gradually developing in all large American cities, and that these cities are laying up a fearful cost for themselves because the city must pay the bill for the evil of sickness and many of the deaths resulting from congestion.

The programme of the nine days of the exhibit follows:

Friday, May 21.—General meeting, Auditorium, Masonic Temple. Address by the President of the United States. Address, illustrated, "Housing Conditions in Washington," by Surgeon-General George M. Sternberg, U. S. A., retired. President, "President's Homes Commission."

Saturday, May 22, 8 p. m.—Banquet room, Hotel Raleigh. Dinner to delegates to national congress.

Sunday, May 23, 10 a. m. to 10 p. m.—Exhibit open to American Federation of Labor and Knights of Labor.

Monday, May 24, 10 a. m. to 7 p. m.—Exhibit open to public. Illustrated lecture to members of Chamber of Commerce, Board of Trade and Federation of Laymen, "World Progress in City Planning," Benjamin C. Marsh, secretary, national committee, 8 p. m.

Tuesday, May 25, 10 a. m. to 12 m.—Exhibit open to officials of government; 12 to 7 p. m., exhibit open to public; 8 p. m., lecture to public, William H. Baldwin, "City Planning in Washington in Relation to Tuberculosis."

Wednesday, May 26.—10 a. m. to 12 m., special display of exhibit for members of Congress; 12 m. to 7 p. m., exhibit open to public; 8 p. m., illustrated lecture, Glenn Brown, "The Park Commission Plans for Washington."

Thursday, May 27.—10 a. m. to 7 p. m., exhibit open to public; 8 p. m., illustrated lecture to public, "World Progress in City Planning," Benjamin C. Marsh, secretary, national committee.

Friday, May 28.—10 a. m. to 7 p. m., exhibit open to public; 8 p. m., illustrated lecture to public, Surgeon General George M. Sternberg, U. S. A., retired, "Housing Conditions in Washington."

Saturday, May 29.—10 a. m. to 7 p. m., exhibit open to officers of public instruction; 8 p. m., illustrated talks on various phases of city planning by delegates to congress.

National Town Planning Congress.—A National Town Planning Congress will be held in the first week of August next, under the auspices of the National Housing Reform Council, London, England. It is proposed that the Congress shall possess the following special features:

1. The studying of actual examples of suburb planning.
2. Consideration of the main principles which should govern town planning schemes.
3. Consideration of the methods by which economy can be secured in the planning of estates on garden suburb lines, e. g., reduction in the cost of road making.

The Congress sittings will be held for the first two days—August 4 and 5—at Port Sunlight. On Friday, August 6, the delegates will proceed to the model colliery village at Woodland, near Doncaster, and on Saturday, August 7, Earswick Garden Village, near York, will be visited. A preliminary list of speakers shows that the following specialists on town planning will attend and speak at the Congress: Prof. Berlepsch Valendas, Munich; Prof. Rud Eberstadt, Berlin; Augustin Rey, Paris; Raymond Unwin, architect, Hampstead Suburb Trust; T. C. Horsfall, author of "The Example of Germany"; Prof. S. D. Adshead, Professor of Town Planning and Civic Design, Liverpool University, and John H. Barlow, secretary, Bournville Village Trust.

New York State Association of City Clerks.—The second annual convention of the Association was held at Niagara Falls, May 20-22, in the Prospect Hotel. The principal topic discussed was the marriage license law. A resolution was drafted which provides that every one empowered to perform a marriage ceremony should be registered with the city clerk or village clerk of the municipality in which he resides. The resolution will be presented to the legislature as an amendment to the present law. The next meeting of the organization will be held in Ithaca.

The following officers were elected: Harold J. Balliet, Buffalo, president; W. O. Kerr, Ithaca, vice-president; W. L. Wartman, Hudson, secretary, and W. J. Rainsford, New Rochelle, treasurer. One of the most notable figures at the convention was D. J. Coutant, City Clerk of Newburgh, N. Y., who holds the record for office holding in his particular position. Mr. Coutant has been City Clerk for 37 years.

Mississippi League of Mayors.—The convention which met at Gulfport, May 30, was not limited in attendance to the chief executives of the municipalities, but included all members of boards of aldermen and city attorneys. The social features included a trolley ride over the entire system of the traction company's line from Biloxi to Long Beach. A visit was made on Sunday morning to Horn Island to board the battleship Mississippi and then to Pascagoula to inspect the silver service. The convention met in the City Hall and listened to an address of welcome by Mayor George M. Foote, and in behalf of the Commercial Union by City Attorney John L. Heiss. The response was by Mayor J. V. Donald, of Hattiesburg. Governor E. F. Noel delivered an address on Municipal Government. Mayor A. C. Crowder, of Jackson, spoke on municipal affairs.

National Fire Protection Association.—About 150 delegates attended the thirteenth annual meeting of the association, May 25-26, in the assembly room of the Board of Fire Underwriters, New York City. President C. M. Goddard outlined the work being done by the association in bringing about better conditions, interesting the public in the situation, encouraging the use of fire preventive devices, the value of standard fire fighting equipment and the construction of better buildings. The feature of the second day's session was an exhibition by the New York Water and Fire Departments of the high-pressure service and the fireboat service.

Morristown Playground Society.—A society has been formed for the purpose of providing suitable playgrounds, under proper care and supervision, for the children of Morristown. They propose as their first project the purchase of certain lots in the neighborhood of Flagler and Water streets and improving them for immediate use. The estimated cost for the land, improvement and maintenance for two years is $12,000. The following officers have been elected: President, Grinnell Willis; vice-president, Henry M. Smith; secretary and treasurer, F. W. Ford.

Northwestern Ohio Firemen's Association.—Preparations continue on a large scale for the convention of the Volunteer Firemen of Northwestern Ohio in Lima, June 15 and 16. Major F. M. Bell, U. S. A., retired, will act as marshal-in-chief of the big parade, in which will be more than 50 bands and twice as many uniformed companies. The old "coal-cart" company, which hauled the wagon of coal to the fires, is being reorganized and will pull the famous old wagon in the parade.

Indiana State Board of Health School.—What is considered as the most successful Health Officers' school in the history of the Indiana State Board of Health was held at the Claypool Building, Indianapolis, May 19-21. The attendance reached 300, or about 100 greater than it was the previous year. Among the addresses were two by Dr. Mazyck Ravenel on tuberculosis. "Bacilli Carriers in Their Relation to the Public Health" was the subject chosen by Dr. J. P. Simonds, Superintendent of the Laboratory of Hygiene of the State Board of Health. He offered the services of the laboratory in searching out bacilli carriers. Dr. W. T. Hoskins spoke on the "Diagnosis and Treatment of Cerebro-Spinal Meningitis." Dr. George B. Lake read a paper on "Ventilation in the Rural Districts."

Washington Association for the Prevention of Tuberculosis.—The association recently placed itself on record as giving unqualified endorsement to the pasteurization of all milk obtained from cows not proven to be free from tuberculosis by the application of the tuberculin test. This action was taken in view of the fact that the National Association failed to endorse a resolution favoring the pasteurization of all milk derived from cows not proven to be free from tuberculosis, because they declined to go on record as endorsing the use of milk from tuberculous cows under any consideration.

National Good Roads Congress.—The second annual congress was held in McCoy Hall, Johns Hopkins University, May 18-22. President Arthur C. Jackson called the convention to order. Governor Crothers of Maryland opened the meeting in an address advocating the construction of highways by the National Government. A telegram was received from President Taft, expressing his great interest in the movement for good roads throughout the country. Mayor Mahool pointed out the benefits of the State roads to Baltimore. Senator Bankhead argued that Congress would make appropriations for road building if the public would make its wishes known. Ex-Senator Dodge said that 33 States are now building roads under a State aid law. In his judgment, the $5,000,000 loan for roads in Maryland will increase farm values by $60,000,000. A paper by Representative Hughes of Georgia stated that the excess cost of transportation owing to bad roads in this country amounted to more than $300,000,000 a year. At the close of the convention resolutions were passed which favored the cooperation of State and Federal Governments in the building of post roads. The resolution reads:

Whereas, Immediately following the first National Good Roads Congress both of the great political parties declared in their national platforms for State or National aid for good roads; and whereas the National government collects and disburses $10 or more for every $1 collected and disbursed by the various State governments;

Therefore, It is the sense of the second National Good Roads Congress that the United States Government should appropriate at least 10 per cent. of the internal revenue to aid the various States in building and maintaining public roads, provided no part of this appropriation be available to any State unless such State appropriates and spends in co-operation with the general government an equal amount for the same purposes.

We believe no greater or more valuable object lesson can be undertaken by the general government in co-operation with the States than the construction and maintenance of permanent national highways connecting Washington with the capital of every State and Territory.

We favor the active co-operation of State and nation in the construction and maintenance of post roads and the aid of the army and its officers for this purpose within reasonable limitations.

We believe in the employment of convict labor in the production and maintenance of public roads.

We appeal to the church, press, schools, civic and commercial organizations, granges, farmers and women's clubs of the whole country for the promotion of the good roads movement.

Georgia Municipalities.—At the League meeting at Columbus last week addresses were made by Rhodes Browne, of Columbus; Miller S. Bell, of Milledgeville; J. L. Fincher, of Fort Valley; Thomas Clayton, of Atlanta; W. C. Campbell, of Columbus; Dr. M. Ashby Jones, George P. Seldon, of New York; W. R. Joyner, of Atlanta; W. F. Dorsey, of Athens, and Charles W. Hopkins, of Atlanta.

New England Water Works Association.—The June field day of the association, Wednesday, June 16, will be devoted to an excursion down Boston Harbor and to Bass Point, Nahant, in which ladies are especially invited to join. At 10 o'clock a. m. the steamer "King Philip" (Captain Dixon) leaves South Side Commercial Wharf, and a visit will be made to the Metropolitan Sewage Pumping Station at Deer Island. At noon the party will leave Deer Island, and at 1 o'clock p. m. there will be a shore dinner at the Bass Point House. At the hotel there are bowling alleys, a dance hall, a baseball field, and other methods of passing the time. The steamer will leave Bass Point in time to make a short cruise before returning to Boston, and to arrive at about 5 o'clock p. m. If time permits it may be arranged to spend a little while in deep sea fishing before returning. A short business meeting will be held at some time during the day for the election of new members. Robert J. Thomas, Lowell, Mass., is president, and Willard Kent, of Narragansett Pier, R. I., secretary of the association.

Chiefs of Police and City Marshals of Texas.—The association met, May 18-21, in the Corporation Court Room, Galveston, Tex. The following officers were elected for the ensuing year: President, Fred. Long, Itasca; first vice-president, John R. Brown, Weatherford; second vice-president, Henry Desplain, Sherman; third vice-president, William H. Perrett, Galveston; secretary-treasurer, M. T. Forrest, Houston; sergeant-at-arms, Master Arthur Forrest, Houston; mascot, Master E. T. Bickers, Monday. Among the addresses delivered was one by Attorney-General R. V. Davidson on the duties and great responsibilities of the police executives and the close relationship existing between the Attorney-General's Department and the police. He discussed informally the laws and their enactment and the makers of the laws and their interpretation by the courts, all to show the great responsibility and duty of the police departments which are to enforce the laws. The Attorney-General paid a high compliment to the chiefs and touched on many subjects in which the police executives and the judicial department of the State are jointly concerned. Mrs. M. E. Holland, associate editor of "The Detective," read a paper on the establishment and management of a bureau for the identification of criminals. Both the Bertillon and the finger-print systems were explained. She gave an account of the rogues' gallery established in the office of "The Detective." A movement was inaugurated which, it is believed, will result in the establishment of a mutual insurance feature for the organization. Sherman was selected for the next meeting place.

League of Michigan Municipalities.—Secretary E. R. Schreiter's announcement regarding the eleventh annual convention to be held in Flint, Mich., June 2-4, states that when the roll-call of cities is read, the representative of each city is expected to tell of one or more specific things accomplished during the past year, which is believed to be useful to the other cities in the State; also to tell what each expects to accomplish in the coming year and how it is proposed to do it. Members are specially invited by the officers to collect and present data regarding light and water, whether supplied by a municipal or private plant.

Calendar of Meetings

June 1-3.
Fire Marshals Association of America.—Convention, Louisville, Ky.—W. S. Rogers, Secretary, Columbus, O.

June 1-4.
National Electric Light Association.—Thirty-second convention, Atlantic City, N. J.—John F. Gilchrist, Engineering Societies Building, 29 West 39th street, New York, N. Y., Secretary.

June 2.
Western Society of Engineers, Chicago, Ill.—Regular Meeting.—J. H. Warder, Secretary, 1735 Monadnock Block, Chicago, Ill.

June 2-4.
League of Michigan Municipalities.—Eleventh annual convention, Flint, Mich. E. R. Schreiter, Secretary, Detroit, Mich.

June 8-10.
Oklahoma State Firemen's Association.—Convention, Chickasha, Okla.—J. Bart Foster, Secretary, Chandler, Okla.

June 8-12.
American Water Works Association.—Twenty-ninth annual convention, Milwaukee, Wis.—J. M. Diven, Secretary, 14 George St., Charleston, S. C.

June 9-11.
Maryland State Firemen's Association.—Convention and Tournament.—H. L. Smith, Secretary, Cumberland, Md.

June 9-11.
Engineers' Society of Pennsylvania.—Convention, Harrisburg, Pa.—F. Herbert Snow, Harrisburg, President.

June 15-16.
South Carolina State Firemen's Association.—Convention and Tournament.—R. S. Hood, Secretary, Sumter, S. C.

June 15-19.
International Association of Police Chiefs.—Annual convention, Buffalo, N. Y. Maj. Richard Sylvester, President, Washington, D. C.

June 16.
New England Water Works Association.—June Field Day; excursion to Bass Point, Nahant.—Willard Kent, Secretary, Narragansett Pier, R. I.

June 16-17.
New York State Association of Fire Chiefs.—Convention, Utica, N. Y.—H. R. Yates, Secretary, Schenectady, N. Y.

June 17-18.
Ohio Boards of Health and Health Officers.—Eighth Conference at Toledo, O.—Dr. C. O. Probst, Secretary, State Board of Health, Columbus, O.

June 22-24.
Municipal League of Indiana.—Annual Convention, Lafayette, Ind.—J. W. Schooler, Secretary, Lafayette.

June 24-25.
American Institute of Chemical Engineers.—Semi-annual meeting, New York, N. Y.—J. C. Olsen, Secretary, Polytechnic Bureau, Brooklyn, N. Y.

June 28.
American Institute of Electrical Engineers.—Annual convention, Hotel Frontenac, Thousand Islands, Frontenac, N. Y.—R. W. Pope, Secretary, 33 West 39th street, New York, N. Y.

June 29-July 3.
American Society for Testing Materials.—Annual meeting, Atlantic City, N. J.—Edgar Marbury, Secretary, University of Pennsylvania, Philadelphia, Pa.

July 5-9.
Minnesota Firemen's Tournament Association.—Annual tournament, Crookston, Minn.

July 6-9.
American Society of Civil Engineers.—Annual Convention, Mount Washington Hotel, Bretton Woods, N. H.—Charles Warren Hunt, Secretary, 220 West 57th street, New York, N. Y.

July 20-22.
Texas Mayors' Association.—Annual Convention, San Angelo.—Mayor F. C. Highsmith, President, Mineral Wells, Tex.

August 17-20.
International Association of Fire Engineers.—Annual Convention, Grand Rapids, Mich.—James McFall, Secretary, Roanoke, Va.

August 25-27.
League of American Municipalities.—Thirteenth annual convention, Montreal, P. Q., Canada.—John MacVicar, Secretary, Des Moines, Ia.

September 8-10.
New England Water Works Association.—Annual convention, New York City.—Willard Kent, Secretary, Narragansett Pier, R. I.

November 9-11.
American Society of Municipal Improvements.—Annual convention, Little Rock, Ark.—A. Prescott Folwell, Secretary, 241 W. 39th St., New York, N. Y.

November 15-19.
National Municipal League.—Annual meeting, Cincinnati, O.—Clinton Rogers Woodruff, Secretary, 705 North American Building, Philadelphia, Pa.

PERSONALS

ASHFORD, SNOWDEN, Building Inspector of Washington, D. C., for a number of years, has been chosen as Municipal Architect, a position recently created by Congress, and will assume his new duties July 1.

BARKER, PERRY, Boston, Mass., recently Assistant Engineer, U. S. Geological Survey at the fuel-testing plants in St. Louis and Jamestown, has become Assistant Chemical Engineer in the fuel-testing department of the Arthur D. Little laboratory of engineering chemistry in Boston, Mass. Mr. Barker is a graduate of the course in chemical engineering at the University of Illinois.

BEARD, JAMES N., Wellsburg, O., has been appointed member of the Water Board.

CARMODY, JOHN T., Mayor of Cedar Rapids, Ia., was shot and dangerously wounded by a burglar at his home.

DUGAN, JOSEPH, Police Inspector of Boston, Mass., has been appointed Chief Inspector of Police succeeding Wm. B. Watts, promoted to the grade of Deputy Superintendent.

FENSTERMAKER, D. C., Tulsa, Okla., Assoc. M. Am. Soc. C. E., has been appointed City Engineer to succeed T. C. Hughes, resigned.

FOX, A. C., New York, N. Y., Contracting Manager of the National Bridge Works, has resigned that position to enter into partnership with Mr. W. E. Truesdell, civil and mill engineer, of New York City, under the firm name of the Truesdell-Fox Co., Engineers and Contractors, with offices at 7 West 38th St., New York City.

GILBERT, P. B., Tahlequah, Okla., has been elected City Clerk. C. M. Roberts has been reelected Police Judge. Claude Duncan, Assessor; W. T. Miller, Street Commissioner; J. T. Powell, City Marshall, and R. H. Couch, City Attorney.

GRIDLEY, F. R., Troy, N. Y., Deputy City Engineer, has resigned, to become engineer for W. J. Beardsley, architect for the new state prison at Bear Mountain, Rockland County, N. Y.

HAMILTON, JAMES A., Lawrence, Mass., has been appointed Chief of the Fire Department to succeed Chief Rutter, and Wm. A. MacCreadie has been appointed Assistant Chief.

HARTFORD, W. H., Chief Engineer of the water works pumping plant of Toledo, O., has resigned on account of ill health, and Charles Nichols, who has been connected with the American Bridge Company and for years had been master mechanic for the Shaw-Kendall Company, of Toledo, has been appointed to the position by Superintendent James M. Wosler, the position paying $150 per month and the use of a home.

HEDDEN, E. B., White Plains, N. Y., has been appointed Assistant City Engineer of Reading, Pa.

HITCHCOCK, FRANK H., Postmaster General, Washington, D. C., has been elected President of the Washington Playground Association, to succeed Arthur C. Moses, who consented to serve as Vice-President.

HOOVER, CLARENCE B., Chemist in the sewage disposal plant, has been authorized by the Board of Service to make a tour of inspection of sewage disposal plants in a number of cities.

JUDSON, MAJOR W. V., Engineer Commissioner of Washington, D. C., presented a paper on reinforced-concrete caissons for breakwaters, piers and abutments before the Western Society of Engineers on May 19.

KETCHUM, PROF. M. S., Denver, Col., dean of the College of Engineering in the University of Colorado, has been granted a leave of absence for the next college year. During his absence he will be associated with H. S. Crocker, consulting engineer, 811 17th St., Denver, Col.

LINDEMAN, THEODORE, New York City, has severed his connection with the Alphons Custodis Chimney Construction Company, as Chief Engineer, and has entered into partnership with Mr. C. W. Bergen in a general engineering contracting business, with offices at 170 Broadway, New York City.

MCDOUGALL, GEO. F., Aberdeen, Wash., has been appointed Superintendent of Public Works; James M. Phillips, Police Judge; Dr. D. A. Schumacher, Health Officer. W. W. Hart, S. K. Bowes and J. A. Hood, Park Commissioners.

MOFFETT, W. B., Lowell, Mass., Supt. of Police, has been retired on a pension of $1,000 a year.

MUELLER, DR. ALBERT N., Rock Island, Ill., has been appointed Health Commissioner, to head the new Health Department created by the City Council.

POMEROY, L. D., Andover, Mass., has resigned his position as Chief of Police.

PRATT, R. WINTHROP, Columbus, O., Chief Engineer of the Ohio State Board of Health, has been appointed Director of Sanitary Engineering for the Republic of Cuba. This is an office recently created by the new Cuban Government. Mr. Pratt has been granted a year's leave of absence from the Ohio State Board of Health, during which time Paul Hansen, now Assistant Engineer, will become Acting Chief Engineer for the Board.

PRIOLEAU, PHILIP J., City Engineer of Jacksonville, Fla.; R. N. Ellis, Superintendent of the Water Works, and Dr. Romero, Health Officer, have been named as a Plumbing Commission by the Board of Bond Trustees.

REA, W. H., Pittsburg, Pa., Chief Smoke Inspector, has resigned.

ROGERS, Rev. Jos. M., Marquette, Mich., has been appointed by Mayor Daniel Vaughan member of the Board of Police Commissioners; Mr. Rogers is pastor of the First Presbyterian Church of that city, and also chaplain of the Marquette prison, and has gained a State-wide reputation, being an authority on penal matters. He is especially interested in work of reformation.

SELLS, MURRAY C., Muskogee, Okla., has been elected City Treasurer. W. F. Rampendahl has been elected City Attorney. Jos. McCusker, City Assessor. J. F. Gaither, Street Commissioner, and Chas. Wheeler, City Clerk.

SPRINGBORN, WILLIAM J., President of the Board of Public Service of Cleveland, O., has declined an offer of the management of an eastern garbage disposal plant which was tendered him after he had succeeded in extracting 20 per cent more grease from a quantity of refuse which had been shipped to Cleveland after being run through the plant of the company; Mr. Springborn has become an expert in the garbage disposal business since the city took over the Cleveland plant, and has been called on by a number of cities to advise on changes in their systems.

WASSMAN, JOSEPH, former Mayor of Chattanooga, Tenn., died recently, aged 72 years; he was one of the city's most prominent merchants, and was a member of the City Board of Education at the time of his death.

WIEGAND, EDWARD, President of the Board of Public Works of New Britain, Conn., has been reappointed as a member of the Board by Mayor George M. Landers; also John Kelly, each for three years.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Street Railways—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we can not guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

BIDS ASKED FOR

State	City	Received Until	Nature of Work	Address Inquiries to
STREET IMPROVEMENTS				
Tennessee	McMinnville	June 3, noon	Bldg. 20 to 65 miles macadam and gravel roads; 15,000 bonds	J. C. Biles, Sec'y Co. Comrs.
Maryland	Towson	June 3, noon	Repaving and treating with pitch com. 8 miles of Pk. Hgts Ave.	E. Stanton Bosley Sec'y Hwy. Comrs.
New York	Geneva	June 3, 7.30 p.m.	Trap rock, macadam surface, 7,500 sq. yds.; 1,000 cu. yds. exc.	W. S. Wood, Sec'y Bd. Pub. Wks.
Ohio	Wooster	June 3, noon	Brick paving, one mile Baughman twp.; cost, $12,824	Wayne County Commissioners.
Ohio	Akron	June 3, 11 a.m.	Grading and macadamizing one mile of road	Mark D. Buckman, County Auditor.
New Jersey	Newark	June 3, 3 p.m.	Grading, curbing and flagging 4 streets	Bd. of Street and Water Comrs.
Indiana	Ft. Wayne	June 3, 7.30 p.m.	Resurfacing 6,500 sq. yds. sheet asphalt	Edw. Lennon, Chm. Bd. Pub. Wks.
Missouri	Fulton	June 3	Constructing 7,600 sq.yds.macadam, 9 in. deep, with tar finish, 4,100 ft. concrete curb and gutter, 4,000 cu. yds. excavation	P. D. Thurmond, City Engineer.
Indiana	Kokomo	June 4, 10 a.m.	Improving McCann street	J. A. Burkhalter, Chm. Bd. Pub. Wks
Ohio	Youngstown	June 4	Constructing pavements on Florencedale ave	W. H. McMillan, Clerk.
Alabama	Selma	June 4, noon	Brick, asphalt, granitoid paving, 10,000 sq. yds. on 5-in. concr.	Julien Smith, City Engineer.
Ohio	Cincinnati	June 4, noon	Paving with boulders, granite gutters, limestone curb, grading, crossings, drains, catch basing, etc., Dorchester ave	Board of Public Service.
Iowa	Cedar Rapids	June 5, 10 a.m.	Brick block paving on concrete, various sts.; tar-filled macadam	L. J. Storey, City Clerk.
Virginia	Haymarket	June 5	Constructing 3 miles macadam road	P. St. J. Wilson, St. Hwy.Com., Richmond.
Virginia	Blacksburg	June 5	Constructing 1 1-2 miles macadam road	P. St. J. Wilson, St. Hwy.Com., Richmond.
Ohio	East Liverpool	June 5	Paving 17th st., bet. Main st. and Clark ave., also bet. tracks	Board of Public Service.
Ohio	Delaware	June 5	Improving South Sandusky street	F. D. King, City Clerk.
Indiana	Columbus	June 7	Constructing 2 1-4 miles gravel road in Wayne twp	John M. Davis, County Auditor.
Indiana	Marion	June 7	Bldg. brick st., 9,160 ft. long. gravel road, 5,100 ft. long	A. Y. Stout, County Auditor.
Indiana	Lawrenceburg	June 7, noon	Grading, draining, crushed stone paving, 39,436 ft. road	Wm. S. Fagoly, County Auditor.
North Dakota	Grand Forks	June 7, 5 p.m.	Constructing cement and slush walks; readvertisement	W. H. Alexander, City Auditor.
Indiana	Decatur	June 7, 10 a.m.	Macadamizing road in Washington township	H. S. Michaud.
New Jersey	Montclair	June 7, 3:30 p.m.	Bituminous telford paving, grading, etc., 2 sts	Wallace Ougheltree, Dir. Freeholders, Newark.
New Hampshire	Pembroke	June 7	Bldg. trap rock road at Pembroke	A. W. Dean, State Engr., Concord.
North Carolina	Andrews	June 7, 4 p.m.	Macadamizing 77 miles of road	Highway Commission.
Kansas	Lawrence	June 7, 5 p.m.	Brick paving 15,000 sq.yds. on concrete, sand filler; curb, 9,200 ft.; excav., 3,900 cu. yds	F. D. Brooks, City Clerk.
Indiana	Danville	June 7	Bldg. J.W.Tod road, Center twp., 12,145 ft. long	Wm. H. Nichols, County Auditor
Indiana	Greenfield	June 7, 2 p.m.	Macadamizing, grading, draining, etc., 2 roads	Chas. H. Troy, County Auditor.
Indiana	Vernon	June 7, 10 a.m.	Bldg. 1 1-2 miles pike road in Gena township	T. Thomas, County Auditor.
Indiana	Liberty	June 7, 2 p.m.	Bldg. C. L. Beard and J. A. Orr gravel roads	Clinton Gardner, County Auditor.
Indiana	Brookville	June 7, 1 p.m.	Bldg. 9,800 ft. gravel road, draining, bridging, etc	C. A. Miller County Auditor.
Indiana	Crown Point	June 7, noon	Bldg. 3 gravel roads, Hobart, one North twp	Charles A Johnson, County Auditor.
Minnesota	St. Paul	June 7, 10 a.m.	Improving Lake ave., St. P. and W. B., and Stilluafar roads	Edw. G. Krahmer, County Auditor.
Massachusetts	Ludlow	June 7, 11 a.m.	Bldg. 1,240 ft. curb and 827 sq. yds. cement sidewalk	A. E Fuller, Chm. Selectmen.
Ohio	College Hill	June 7	Constructing cement sidewalks on Maple and other sts	F. R. Strong, Village Clerk.
Indiana	Grunsburg	June 7	Constructing 4 macadamized roads; length 27,443 ft.	Frank E. Ryan, County Auditor.
Ohio	Lowellville	June 7, noon	Laying all stone and artificial stone sidewalks in 1909	Geo. R. Schrader, Village Clerk.
Iowa	Des Moines	June 7	Asph. pav. on concrete, 4,545 sq. yds.; curb and gutter, 2,640 ft.	Geo. F. Poorman, City Clerk.
Indiana	Muncie	June 7	Paving portions of 9 sts.; brick, bitulithic, asphalt or block	Board of Public Works.
Ohio	Steubenville	June 7	Grading, curbing, paving, 3 sts	H. G. Simpson, Clk. Bd. Pub. Serv.
New York	Pelham	June 8, 8 p.m.	Bldg. 40,000 lin. ft. cement sidewalks; 15,000 sq. yds. macadam	A N. White, Pres. Village Trustees.
Indiana	Covington	June 8	Bldg. 2 gravel roads, one in Cain and other in Jacksonburg	Board of County Commissioners.
Pennsylvania	Scrubgrass	June 8, 1 p.m.	Constructing road on Main, Watsar and other sts. in village	Aaron Koch, Chm. Trop. Superv.
Ohio	Bucyrus	June 8	Constructing 5 miles roads; 3 miles of top dressing	Vernon Township Trustees.
Indiana	Fowler	June 8, 1 p.m.	Bldg. 7 County roads, etc.; cost, $55,000	Lemuel Shipman, County Auditor.
Indiana	Vincennes	June 8, 2 p.m.	Constructing 27,975 ft. in Knox Co. gravel roads	J. T. Scott, County Auditor.
Wisconsin	Janesville	June 8, 2 p.m.	Bldg. delinquent sidewalks, etc., Cherry st	W. F Carle, Chm. St. Assess. Com.
Indiana	Huntington	June 8, 8 p.m.	Constructing sidewalks during year	J. C. Beaver, City Clerk.
Indiana	Versailles	June 8, noon	Constructing about 2 miles of macadam road	Nicholas Voltz, County Auditor.
New Jersey	Ocean City	June 8, noon	Bldg. second section of Goshen road, 2,603 miles long	R. Fendall Smith, County Engineer.
New Jersey	Atlantic City	June 9, 11.30 a.m.	Grading and graveling Cologne and Port Republic road	E. D. Rightmire, County Engineer.
New Jersey	Freehold	June 9, 11 a.m.	Bldg. gravel road in 3 townships; $1,000 check	Geo W. Patterson, Clk. Freeholders.
New Jersey	Camden	June 9, 11 a.m.	Bldg. stone road 22 ft. wide from Camden to Haddonfield; 4.13 miles of either Amesite or asphaltum-oil macadam	J. J. Albertson, County Engineer.
Ohio	Cleveland	June 9, 11 a.m.	Furnishing brick for road repairs	W. F. Black, County Clerk.
Missouri	Kansas City	June 9, 2 p.m.	Furnishing asphalt paving plant complete	Rob't W. Goodnow, Sec'y Bd. Pub. Wks.
Virginia	Norfolk	June 10, noon	Bldg. 10,300 sq. yds. smooth pavement, 4,800 ft. curb	J. D. Hank, Sec'y Bd. Local Impvts.
Indiana	Rushville	June 10, 2 p.m.	Constructing macadam road between Rush and Fair Counties	J. M. Stone, County Auditor.
New Jersey	Elizabeth	June 10, 2.30 p.m.	Constructing 75,000 sq. yds. of macadam, etc., 4 roads	Henry Krouse, Chm. Bd. Freeholders
Pennsylvania	Pittsburg	June 11, noon	Improving several roads	R. J. Cunningham, Co. Comptroller.
Ohio	Cincinnati	June 11, noon	Constructing tarvia road on Reading pike; bldg. culvert, Mill Creek township	Stanley Struble, Pres. Co. Comrs.
Pennsylvania	Pittsburg	June 11, noon	Pavement improvement 10 miles; 3 roads	R. J. Cunningham, County Auditor.
New Jersey	Somerville	June 12, noon	Grading and macadamizing 4 roads, aggregating 5.22 miles	Thos. E. Gibson, Dir. Bd. Freeholders.
Wisconsin	Fond du Lac	June 12, 3 p.m.	Constructing 16,000 sq. yds. asphalt pav.; 3,000 sq. yds. brick	C. L. Hohensee, Clk. Bd. Pub. Wks.
Dist. Columbia	Washington	June 14, 11 a.m.	Grading, installing, drainage, etc., Arlington Nat'l Cemetery	Maj. M. Grav Zalinski, U. S. Army.
New Jersey	East Orange	June 14	Furnishing 100,000 gals asphalt tar to use for roads	Frederic A. Reimer, City Engineer.
Massachusetts	Lynn	June 14, 10 a.m.	Regrading Lynnfield st.; earth and rock excav., culverts, improvement, gravel surfacing	Bd. County Comrs. Salem.
Texas	Temple	June 15	Vitrified brick paving; $50,000 bonds available	City Engineer Smith.
Maryland	Harve Grace	June 15, noon	Paving 23,000 sq. yds. on certain sts	C. C. Pusey, Sec'y St. Imp. Comrs.
Pennsylvania	Mt. Pleasant	June 15, 8 p.m.	Paving 10,000 sq. yds. curb, 8,414 ft. excav., 6,690 cu. yds., 3 sts. sewers, 4 sts	C. F. Stoner, Boro. Sec'y Pro. Tem.
Ohio	Piqua	June 15, noon	Brick, macadam, or bituminous macadam, 14,800 sq. yds.; grading, curbing, culverts, etc., High st	W. B. Mitchell, Clk. Bd. Pub. Serv.
Ohio	Cleveland	June 16, 11 a.m.	Improving Chardon road	Wm. F. Black, County Clerk.
Ohio	Columbus	June 18, noon	Macadamizing Chillicothe pike, 1.84 miles long	F. M. Sayre, County Auditor.
Ohio	Cincinnati	June 18, noon	Pile foundation for culvert, Columbia twp., Spec. 918	Stanley Struble, Pres. Co. Comrs.
New York	Plattsb'g Bar'cks	June 18	Rebldg. 23,000 sq. yds. road	Constructing Quartermaster.
Florida	Bradentown	June 25	Paving various streets; brick or macadam	A. J. Beck, Sec'y Bd. City Trustees.
Texas	Temple	June 25, 6 p.m.	Paving streets	Wm. Ginnuth, Mayor.
Michigan	Muskegon	July 1	Paving with macadam and tarvia, several streets	B. H. Tellman, City Recorder.
SEWERAGE				
Minnesota	St. Paul	June 3	Constructing sewers in Front and Kentucky sts	M. J. McMahon, City Clerk.
Illinois	Chicago	June 3, 11 a.m.	Constructing tile pipe sewers in 13 sts	C. A. V. Standish, Sec. Bd. Local Imp
Pennsylvania	York	June 3	Bldg. storm sewer, 2 sts., by foot plan, excav., etc	R. B. McKinnon, City Engr.

BIDS ASKED FOR

State	City	Received Until	Nature of Work	Address Inquiries to
			SEWERAGE—Continued	
Pennsylvania...	Emsworth.....	June 3, 5 p.m.....	Bldg. 1,700 ft. 8-in sewer, 62 Y's, 2 flush tanks, 2 streets.....	McBride Surveying and Eng'g Co., Ltd., Fitzsimons, Bldg. Pittsburg.
Ohio.....	Youngstown....	June 4, noon.....	Sewering Garland ave. bet. Oak st. and Himrod ave.....	W. H. McMillin, Clk. Bd. Pub. Serv.
Kentucky.....	Louisville.....	June 4, noon.....	Bldg. 2,290 ft. 30 and 24-in. sewer, inc. 425 cu. yds concrete and 3,000 lbs. reinforcing steel, Sec. B. N. E. Sanitary Sewer....	J. B. F. Breed, Ch. Engr. Sew. Com.
Pennsylvania ..	North Braddock.	June 4, 3 p.m.....	Bldg. 650 ft. 8-in. pipe, 3 manholes, 1 lamp hole, Rose alley...	C. A. Stewart, Boro. Engr.
Illinois.....	Chicago.....	June 4, 3 p.m.....	Bldg. parts of testing station, nr. 39th st. sewer pumping station.	G. M. Wisner, Ch. Engr. San. Dist.
Iowa.....	Cedar Rapids....	June 5.....	Bldg. 8 to 30-in vit. pipe and 36-in. single brick sewers, several streets.....	L. J. Storey, City Clerk.
Georgia.....	Marietta.....	June 5, 3 p.m.....	Furn. material and bldg. sanitary sewer system; 11 miles 8-15 in. pipe sewer, manholes, flushing tanks, lampholes, etc....	W. T. Black, City Clerk.
Kansas.....	Lawrence.....	June 7, 5 p.m.....	Bldg. 1,400 ft. 8-in. pipe, 40 Y's; 850 ft. 8-in. pipe, 25 Y's.....	F. D. Brooks. City Clerk.
Ohio.....	Newburg.....	June 7, noon.....	Bldg. Buckeye road sewer, also 2 Sections Union st. sewer.	E. T. Lawrence, Clk. Bd. Pub. Serv.
New York.....	Oneonta.....	June 7.....	Constructing sewer in Chestnut st.....	O. M. Miller, City Engr.
Oklahoma.....	Hartshorne.....	June 7.....	Furn. sewer pipe, fittings, etc., for bldg. sewer, also for water systems.....	O'Neil Eng'g Co., Dallas, Tex.
Minnesota	E. Grand Forks .	June 7, 3 p.m... ..	Constructing sewer in several streets.....	C. P. Zimmerman, City Clerk.
Ohio.....	Ironton.....	June 7, noon.....	Bldg. concrete, brick or pipe, storm sewer in Ninth st.....	Geo. H. Davies, Clk. Bd. Pub. Serv.
Ontario.....	Toronto.....	June 8, noon.....	Bldg. sec. 4 and 5 of high lever interceptor; C. H. Rust, C. E..	Joseph Oliver, Mayor.
New Jersey....	Hoboken.....	June 9, 4 p.m.....	Bldg. brick sewer, 6-in. iron pipe house con., etc., Madison st..	James H. Londrigan, City Clerk.
Minnesota.....	Albert Lea.....	June 10.....	Constructing 2,495 linear ft. 15-in. pipe sewer, 110 ft. 40x48-in. reinforced concrete, 243 ft. 15x48-in., 1,140 ft.12x36x48, 497 ft. 12x33x44; concrete outlet and inlet, lift, etc.....	Wm. Barneck, City Engineer.
Kansas.....	Manhattan.....	June 13.....	Constructing $76,000 sewer system; Burns & McDonnell, Engrs.	C. M. Birch, City Engineer.
New York.....	South Nyack....	June 10.....	Bldg. 7 sections of sewers.....	A. T. Themans, Village Clerk.
Dis. of Columbia	Washington.....	June 14, noon..	Constructing sewers.....	Asa Phillips, Supt. of Sewers.
Pennsylvania ..	Mt. Pleasant....	June 15, 8 p.m.....	Sewering Eagle and Spring sts., and Eagle st. and Zuck alley..	C. F. Stover, Boro. Sec., Pro. Tem.
Wisconsin.....	Plymouth.....	June 15, 8 p.m.....	Laying 7,710 ft.6-in. sewer pipe, 6,492 ft. 8-in., 2,755 ft. 10-in., 330 ft. 12-in., 155 ft. 15-in., 280 ft. 20-in., 410 ft. 24-in. sewers.	C. W. Jackson, City Clerk.
Idaho.....	Bonners Ferry...	July 15.....	Constructing $30,000 sewer system.....	H. A. Leslie, Sec'y Bridge Com.
New Mexico....	Clovis.....	June 16, 3 p.m.....	Bldg. complete sewer system; Burns & McDonnell, C. E.. ...	E. R. Hart, Mayor.
Kentucky.....	Louisville.....	June 18, noon.....	Bldg. sec. C-2, Beargrass interceptor, cont. No. 41.; 2,720 ft. 5ft. 2-in. sewer in trench not over 28 ft. deep, inc. 2.500 cu. yds. concrete and 152,000 lbs. of steel.....	J. B. F. Breed, Ch. Engr. Sew. Com.
Indiana.....	South Bend.....	June 18, 10 a.m....	Bldg. Mead st. trunk sewer, 2 miles, 20-66-in.....	W. A. McInerney, Pres. Bd. Pub. Wk.
South Dakota..	Aberdeen.....	June 21, 8 p.m.....	Constructing 1,100 ft. 8-in.; 2,700 ft. 10-in., 2,900 ft.12-in., 9,000 ft. 15-in., vit. pipe sewer.....	F. W. Raymond, City Auditor.
Kentucky.....	Louisville.....	June 25, noon.....	Bldg. sec. A. N. W. sewer, cont. No. 42; 6.5 ft., rein. concrete sewer outlet into Ohio River at Shawnee Park, 390 ft. long, to include 1,000 cu. yds. concrete and 2,000 ft. piles.....	W. C. Nones, Chr. Sewer Com.
New Mexico....	Albuquerque....	July 10.....	Constructing sewers.....	S. M. Gray, C.E., Providence, R. I.
			WATER SUPPLY	
Illinois.....	Chicago,.....	June 3, 11 a.m.....	Constructing water supply pipes in 13 sts.....	C. A. V. Standish, Sec. Bd. Loc. Imp.
Missouri... ..	Carthage.....	June 3, 8 p.m.....	Furn. water pipe, hydrants and valves.....	M. A. Earl & Co., Engrs.
New York.....	New York.....	June 3, 11 a.m.....	Cont. 20, Catskill aqueduct, Moodna, siphon, a deep pressure tunnel in rock, 14 ft. 2 in. diam., 2,500 ft. long, with 7 shafts, 340 to 450 ft. deep, etc.....	John A. Bensel, Pres. Bd. Wtr. Sup.
Alabama.....	Fort Morgan....	June 4, 1 30 p.m...	Bldg. 2 rein. concrete cisterns for fort.....	Capt. H. B. Chamberlain, Q. M.
Minnesota.....	E. Grand Forks.	June 7, 3 p.m.....	Constructing 6-in. water main in several sts.....	C. P. Zimmerman, City Clerk.
Minnesota.....	Chaska.....	June 7, 8 p.m.....	Extending water mains on 2 sts.....	J. M. Aretz, City Clerk.
Virginia.....	Grundy.....	June 5.....	Installation of water plant at Grundy.....	T. Belcher, Big Rock.
Georgia.....	Toccoa.....	June 5, noon.....	Constructing filter, etc.; J. B. McCrary & Co., C.E., Atlanta..	John Edge, Chm. Water Com.
Indiana.....	Jasper.....	June 7, 8 p.m.....	Constructing concrete reservoir, 113 x 96 x 17 ft.....	J. P. Schwenk, Town Clerk.
North Dakota..	Marmarth	June 7, 7 p.m.....	Installing 1,365,ft. 6-in. water mains and 5 hydrants.....	Robt. H. Smith, Village Clerk.
Ohio.....	Minerva.....	June 7.....	Water tank and tower, capacity, 100,000 U. S. gallons.....	F. A. Unkefer, Sec'y Bd. Pub. Affrs.
California.....	San Francisco...	June 7.....	Furn. 1,200 hydrants for auxiliary water system.....	Marsden Manson, City Engineer.
New Jersey....	Hoboken.....	June 7, 3 p.m.....	Laying 16-in water main in 15th and other streets.....	Edw. Carroll, Pres. Water Board.
New York.....	Syracuse.....	June 7, 1 30 p.m...	Constructing steel standpipe.....	F. X. Piper, Sec'y Bd. Cont. & Sup.
Ohio.....	Ironton.....	June 7, noon.....	Dredging and breaking hard pan outside well clusters, Ohio Riv.	Geo. H. Davies, Clk. Bd. Pub. Serv.
Oklahoma.....	Hartshorne.....	June 7.....	Furn. all c. i. pipe, standard fire hydrants, water gate valves, pumps, and boilers required for new system, etc.; O'Neill Eng. Co., Dallas, Tex.....	The Mayor.
North Dakota..	Grand Forks....	June 7, 4 p.m.....	**Constructing water mains on 3 streets**.....	W. H. Alexander, City Auditor
Kansas.....	Fort Riley.....	June 8, 10 a.m.....	Extension to water supply mains and additional hydrants....	Capt. W. H. Whitman, Q. M.
Michigan.....	Norway.....	June 8, 2 p.m.....	Labor and material for additions to w. w., inc. 5 miles 10-20-in. c. i. pipe; water inlet screening chamber, valves and boxes, meter, etc.; also water tank, 35 ft. diam., 41 ft. high.....	Gordon Murray, Mayor.
Ohio.....	Columbus.....	June 9, 3 p.m.....	Artesian well and pumping plant at Federal Bldg.....	James Knox Taylor, Wash., D. C.
Pennsylvania...	Clearfield.....	June 9, noon.....	Bldg. reservoir on Moose Run, inc. 16,000 cu. yds. embankment and 1,800 cu.yds. masonry, also for bldg.distributing reservoir on Cemetery Hill; 6,600 cu.yds. excav.; 1,000 cu.yds. concrete masonry.....	J. B. Nevling, Sec'y Water Co.
Minnesota.....	Moorhead.....	June 8, 8 p.m.....	Constructing 335 ft. 8-in., 3,804 ft. 6-in., 1,778 ft. 4-in pipe...	R. G. Price, City Clerk.
New York.....	New York.....	June 9, 2 p.m.....	Furn. and laying high pressure fire mains, etc., East Side sts	John H. O'Brien, Com. W. S. G.&.E.
Nebraska.....	St. Edward.....	June 11.....	Bldg. water works, plans by Chas. F. Sturtevant, Holdredge..	W. F. Flory, Village Clerk.
New York.....	Plattsburg Bar'ks	June 11, 11 a.m....	Bldg. filter house, electric wiring; also furn. and installing pressure filter, capacity 600 gals. per minute	Constructing Quartermaster, U. S. A.
Connecticut....	Norwalk.....	June 12, 4 p.m.....	Bldg. earth and concrete dam over Silver Mine River, Lewisboro, N. Y., 3,146 cu. yds. concrete; 50,000 cu. yds. excav.....	Fred. Buckly, Sec'y Water Board.
Ohio.....	Mt. Healthy.....	June 12.....	Material and labor for building water works.....	Frank R. Hunt,Clk. Bd. Pub. Affairs.
Wyoming.....	Ft. Yellowstone..	June 12.....	Bldg. rein. concrete reservoir.	Lt. G. C. Smith, Constr. Q. M.
Kansas.....	Plainville.....	June 14, 8 p.m.....	Material and labor for $19,500 water works; J. H. Burkholder, C. E.....	U. S. Green, City Clerk.
California.....	San Francisco...	June 14.....	Furnishing gate-valves for distribution system.....	Chas. A. Day, Pres. Bd. Pub. Wks.
Ontario.....	Peterborough....	June 14, noon.....	Furn. and install. one or two pumping units of 3,000,000 Imperial gals. each 24 hours, and w. w. pumps with turbine wheels, etc.....	S. R. Armstrong, Sec'y Wtr. Comrs.
Porto Rico.....	Guayama.....	June 14, 2 p.m.....	Bldg. 24 miles main canal, etc., inc. 4 tunnels and 5 rein. concrete siphons; for irrigation; cost, $153,000.....	H. L. Fischer, Sec'y Municipal Bd.
Wyoming.....	Cheyenne.....	June 15, 2 p.m.....	Laying 5 miles 30-in., 16 miles 20-in., 4 miles 16-in. c. i. pipe, complete; pipe, etc., to be furn. by city	C. C. Carlisle, City Engineer.
Oklahoma.....	Okemah.....	June 15.....	Furn. all pipe, fittings, hydrants, valves, etc., for constructing municipal water plant; O'Neill Eng. Co., Dallas, Tex.....	Chairman of Town Board.
New Mexico....	Clovis.....	June 16, 3 p.m.....	Constructing water works, lighting plant and sewers.....	Burns & McDonnell, Engrs., Scarritt Bldg., Kansas City, Mo.
Virginia.....	Fort Hunt.....	June 16.....	Bldg. reservoir and pump house, inc. dynamos, mach., etc....	H. L. Pettus, Takoma, D. C.
New York.....	Cohoes.....	June 17, 10 a.m....	Furn. and installing mechanical filters, standpipes, pump mach.	W. J. Quirk, Sec'y Water Bd.
Colorado.....	Ft. Collins.....	June 21, noon.....	Constructing filtration plant, capacity 4 millions gal., either slow sand or mechanical filters.....	Robt. S. Fedder, City Clerk.
Philippine Is...	Manila.....	July 1, noon.....	Furn. gate valves, air valves and fire hydrants for city.....	B.M.Hall, C.E., Int.Dept., Wash,.D.C
			BRIDGES	
New York.....	New York,.....	June 3, 2 p.m.....	Bldg. railings, stairways, etc., roadway and footwalk pavements, track and electrical equipment of Manh. bridge.....	J. W. Stevenson, Comrs. of Bridges.
South Carolina.	Spartanburg.....	June 3, 10 a.m.....	Bldg. wood or steel bridge over Peter's creek, Cannon's road..	D. M. Miles, County Superv.
Pennsylvania...	York.....	June 3.....	Bldg. concrete bridge over Poorhouse run, cribbing, etc	Joseph Rose, Chm. Highway Comrs.
Ohio.....	Cincinnati.....	June 4, noon.....	Bldg. concrete bridge on Bank Lick road, Spec. 862.....	Fred. Dreihs, Clk. Co. Comrs.
Ohio.....	Toledo.....	June 4, 10 a.m.....	Labor and material for superstructure of bridge over Swan creek Co. Road No. 125, Waterville twp.; also for 2 concrete abutments and for repair of bridge, E. Jerusalem twp.....	D. T. Davies, Jr., County Auditor.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			BRIDGES—Continued	
Ohio	Dayton	June 5, 11 a.m.	Constructing superstructure over Sugar Creek	F. E. Tunnison, Clk. Co. Comrs.
Ohio	Cleveland	June 5, 11 a.m.	Bridge work per Report No. 2350, embankment Newburg twp.	Clerk County Commissioners.
Utah	Provo	June 5, 10 a.m.	Bldg. 100 ft. span, 16 ft. roadway over Provo river	Frank Wentz, County Surveyor.
Mass	Ludlow	June 7, 11 a.m.	Bldg. concrete bridge over Stone Brook, 20 ft. clear rdwy.	A. E. Fuller, Chm. Selectmen.
Indiana	Columbus	June 7, 10 a.m.	Bldg. 2 rein. concrete, flat-top, girder bridges, 2 twps	Bd. Comrs. Bartholomew Co.
Missouri	Richmond	June 7	Bldg. number of short span bridges, concrete, etc	John M. Rhoades, Co. Hwy. Engr.
Indiana	Bluffton	June 7	Constructing seven bridges for Wells County	O. D. Garrett, County Auditor.
Indiana	Indianapolis	June 7	Bldg. 2 bridges, one over Pleasant river and one over canal	Blaine H. Miller, City Engineer.
Wyoming	Sheridan	June 7, noon	Bldg. cement or steel bridge over Creek on Main st	C. W. Sheldon, City Clerk.
South Dakota	Britton	June 8	Constructing 3 steel bridges	M. N. Brigstock, County Auditor.
Ohio	Upper Sandusky	June 8, noon	Bldg. stone abutment at Mackey bridge in Eden twp	J. N. Traxler, County Auditor.
Indiana	Vincennes	June 8, 2 p.m.	Constructing 8 bridges	John T. Scott, County Auditor.
West Virginia	Wheeling	June 8	Constructing abutment piers and wires for dam No. 11	Capt. F. W. Alstaetter.
Missouri	Mexico	June 8	Constructing seven steel bridges ordered by County Court	J. J. Wakefield, Highway Engr.
New Jersey	Freehold	June 9, 11 a.m.	Bldg. rein. concrete bridge over Shark river, Asbury Park	John M. Broly, Engr., Villa Park.
New Jersey	Ocean City	June 9	Bldg. rein. concrete ornamental bridge, 30 x 30 ft	Ocean City, Bayous Co.
Pennsylvania	Philadelphia	June 9, noon	Work on abolishment of grade crossings, Cont. No. 4; masonry embankment Jeff. and Montgomery sts.; Cont. No. 6; bridges ready for ballast, same streets	W. Hunter, Ch. Engr. P. & R. Ry.
Montana	Hinsdale	June 9	Bldg. 180-ft. span bridge over Mith river; cost, $8,000	O. Shoemaker, County Clerk.
Washington	Marietta	June 9, 2 30 p.m.	Removing draw bridge to new position; bldg. wing dams and approaches; also bldg. pile bridge in place of draw span	Chas. A. Lindbery, County Engr.
So. Carolina	Spartanburg	June 10	Bldg. Enoree bridge over Enoree river; wood or steel structure	D. M. Miles, County Supervisor.
Indiana	Kokomo	June 10, 10 a.m.	Constructing rein. cement arch bridge over Wildcat creek	A. B. Easterling, County Auditor.
Texas	Weatherford	June 10	Constructing 100-ft. concrete bridge; N. Werenskiold, C.E.	C. W. Camp, City Engineer.
Tennessee	Knoxville	June 10, 10 a.m.	Bldg. rein. concrete viaduct on Asylum ave	J. W. Fleanikon, Chm. Bd. Pub. Wks.
Ohio	Cincinnati	June 11, noon	Constructing culvert in Mill creek township	Fred. Driehs, Clk. Co. Comrs.
Ohio	Greenville	June 12, 11 a.m.	Bldg. Shields bridge	A. T. Marker, Clk. Co. Comrs.
Pennsylvania	Philadelphia	June 15, noon	Abolishing grade crossings, Contracts 9, 10 and 11	W. Hunter, Ch. Engr. P. & R. Ry.
New York	New York	June 17, 3 p.m.	Repairs to timber bridges in Dyker Beach Park, Brooklyn	J. W. Stevenson, Comr. of Bridges.
Ohio	Cincinnati	June 18, noon	Repairing brdg. on Spring Grove av., over Mill crk., Mill creek twp.	Fred Driehs, Clk. Co. Comrs.
Oregon	Portland	June 20, noon	Bldg. bridge over Willamette river; 3 riveted spans, 210 ft. each; 3 spans 242 ft., on concrete piers on timber cribs; one span to be lifted by electrical machinery, out of steel, 2,300 tons	Harry Lane, Mayor.
Texas	Galveston	June 28, noon	Building a causeway across Bay between Galv. Island and Virginia point, 10,642 ft. long, arch bridge, 2,742 ft. long; lift bridge to have clear span of 100 ft. and roadway will be 8,170 ft long; bids in 3 parts; arch bridge, lift bridge and roadway.	John M. Munch, County Auditor.
Ohio	Toledo	July 1, noon	Labor and material for rein. concrete arch bridge (except lift draw); also foundations, piers, apparatus, etc., for bridge over Maumee river at Main st.: $525,000 available; check, $50,000.	Reynold Volt, Sec'y Bd. Pub. Serv.
Idaho	Hailey	July 10	Constructing bridge over Aubrey creek	Board of County Commissioners.
			LIGHTING AND ELECTRICITY	
Dist. Columbia	Washington	June 5, noon	Lighting sts. with mantle naptha lamps for 1 year	H. B. F. MacFarland, Pres. Bd. Coms
California	Oakland	June 7, 5 p.m.	Lighting sts., etc., for 1 year, begin June 30 with 900 or more arc lights; also with gas; caring for lamps, etc., $25,000 bond.	Frank R. Thompson, City Clerk.
Dist. Columbia	Washington	June 7, 2 p.m.	Furn. 3 motor sets, 9 switchboards and installing same with all wires, etc., in 3 high school bldgs	H. B. MacFarland, Pres. Bd. Cosm'
New York	New York	June 9, 11 a.m.	Repairs, alterations, etc., electric equipment, 9 school bldgs.	C. B. J. Snyder, Supt. Scel. Bldgs.
New York	New York	June 7, 2 p.m.	Furn. and maintaining electric lamps for lighting sts., aves. and public places from June 7 to Dec. 31, 1909	John H. O'Brien, Com. W. S., G. & E.
Ohio	Cleves	June 7, noon	Lighting sts., alleys, etc., with electricity for 10years	G. W. Gwaltney, Village Clerk.
Virginia	Honaker	June 7	Electric light franchise	C. A. Honaker, Recorder.
Indiana	Vincennes	June 8, 2 p.m.	Lighting sts. at expiration of existing contract Apr. 29, 1910, for 10 yrs. with 260 enclosed arc lamps of 2,000 c.-p. equal to 466 watts each, or 7.5 amperes at 70 volts at lamp terminals; in addition 220 16-c.-p. incandescent lamps must be placed ready for use; guaranty check, $2,000	C. L. V. Tucker, Clk. Bd. Pub. Wks.
Tennessee	Nat. Sold. Home.	June 8, noon	Install. complete, water-tube boiler in power house	Paul E. Divine, Treas. Soldiers' Home
New York	Middletown	June 9, 3 p.m.	Outside lighting at Middletown State Homeopathic Hospital.	F. B. Ware, State Arch., Albany.
Massachusetts	Boston	June 9, noon	Bldg. underground fire alarm branch for Fire Department	Samuel D. Parker, Fire Comr.
New York	Brooklyn	June 9, 11 a.m.	Pump. engine and power plant for operating Gowanus tunnel.	Bird S. Coler, Boro. Pres.
Ohio	North Bend	June 14	Lighting sts., alleys, etc., with electricity for 10 years	Thomas Hynes, Village Clerk.
Pennsylvania	Slatington	June 15, 6.p.m.	Lighting boro. sts. for 5 years; gas or electric	A. N. Kennel, Boro. Sec'y.
New York	Fort Hamilton	June 15	Electric lighting system and sub-station at post	Constructing Quartermaster.
New York	Fort Totten	June 15, 2 p.m.	Constructing electric lighting system at Fort Totten	Constructing Quartermaster.
Louisiana	New Orleans	June 15	Furn. and installing electric fixtures in Court House	Bernard McCloskey, Hibern. Bk. Bldg
Kansas	F. Leavenworth	June 15	Furn. and install. machinery and bldg. power plant at U. S. prison	Maj. T. H. Stevens, Military Prison.
New Mexico	Clovis	June 16	Bldg. electric light plant, water works and sewer system	E. R. Hart, Mayor.
Virginia	Basic City	June 17	Constructing hydro-electric light plant	C. M. Page, Treasurer.
Ontario	Kingston	June 19, noon	Repairing concrete gas holder tank of city	H. B. R. Craig, City Engineer.
Dist. Columbia	Washington	June 26, 11 a.m.	Furn. one 1,000 and two 1,500 k.w. turbo-alternators for navy yard	Admiral R. C. Hollyday, Navy Dept.
Massachusetts	Boston	July 1	Lighting sts. with gas for 5 years from Sept. 15; 20 to 50 lights; bidders to furnish apparatus for practical tests	Guy C. Emerson, Supt. Streets.
			MISCELLANEOUS	
New York	New York	June 3, 3 p.m.	Furn. 300 12-in. and 25 20-in. expanded metal tree guards for Bronk parks, 1,000 cu. yds. loam or top soil, 1,500 cu. yds. garden mold, also rebldg. crib work and filling in Harlem river bank in Macomb's Dam Park	Henry Smith, Pres. Park Bd.
New York	New York	June 3, 3 p.m.	Erecting shelter and comfort station, Riverside Drive	Henry Smith, Pres. Park Bd.
New York	New York	June 3, 3 p.m.	Constructing Chelsea park in Borough of Manhattan	Henry Smith, Pres. Park Bd.
Utah	Salt Lake City	June 4	Erecting addition to garbage bldg, No. Salt Lake	L. C. Helsey, City Engineer.
New Jersey	Newark	June 4, 2 p.m.	Furnishing hospital automobile ambulance	Geo. J. Althen, Chm. Co. Comrs.
New York	New York	June 7, noon	Repairing municipal ferry boats and other floating property, etc.	Allen N. Spooner, Com. of Docks.
New York	New York	June 9, noon	Furn. and delivering, 35 sweeping machines	W. H. Edwards, Com. of St. Cleaning
New York	New York	June 9, noon	Furn. parts for sweeping machines	W. H. Edwards, Com. St. Cleaning.
South Carolina	Yorkville	June 9	Eight 4-bunk steel cells and appurtenances for County jail	C. F. Gordon, Superv. York Co.
Ohio	Lakewood	June 9, noon	Collecting garbage for 18 months	B. M. Cook, Village Clerk.
Pennsylvania	Pittsburg	June 9, noon	Furnishing and installing a water power air compressor plant	H. C. Newcomer, Major U. S. Engrs.
California	San Francisco	June 10, 11 a.m.	Bldg. 2 sections sea wall, 1,300 ft. long; cost, $200,000; Sec. 8, 300 ft. long, 32,000 tons rock fill., 4,000 bbls. cement; Sec. 9, 1,000 ft. concrete sea wall, inc. 1,000 ft. concrete bulkhead, 85,000 tons rock fill., 181 tons structural steel; 13,000 bbls. cement; structures go 30 ft. below city base	W. S. Thorpe, Sec'y Harbor Board.
South Carolina	Barnwell	June 10	Erecting County jail and Sheriff's residence	Geo. G. Smith, Arch., Asheville, N. C.
Dist. Columbia	Washington	June 12, noon	Bldg. wharf and bulkheads, inc. dredging, etc	Maj. W. V. Judson, Engr. Comr.
New York	New York	June 15, 3 p.m.	Furn. and erecting complete, 20 automatic weighing and recording scales for Customs Service	J. B. Reynolds, Treas. Dept., Wash. D.C
New Jersey	Newark	June 15	Gymnasium for Barringer High School, $50,000 appropriation.	Sec'y Board Education.
West Virginia	Wheeling	June 18	Bldg. abutments and wickets, dam No. 11, Ohio river	U. S. Engineer Officer.
Ohio	Cincinnati	June 21	Furn. 14,000 bbls. Portland cement at Fernbank	Col. Wm. T. Rossell, Engr. Corps.
New York	N. Brighton, S. I.	June 22, noon	Bldg. retaining walls, etc., approaches to St. George ferry	Geo. Cromwell, Pres. Boro. Richmd.
New York	Albany	June 22, noon	Erie canal Contracts Nos. 30, 36, 42; 145 miles long, cut 3,160,000; furn. winches for movable dam, $45,000; improving 9 miles of canal, $1,628,000	F. C. Stevens, State Supt. Pub. Wks.
Ohio	Columbus	July 15, noon	Bldg. concrete retaining wall; Contract No. 18, inc. 800 cu. yds. excav., 765 cu. yds. loam, 1 acre seeding, 220 sq. yds. sodding, 800 cu. yds. concrete, 2,000 lbs. twisted steel rods	E. W. Hirsch, Sec'y Bd. Pub. Serv.
Illinois	Chicago	Sept. 15	Furn. voting machines up to $400 000 value	Election Commissioners.

STREET IMPROVEMENTS

Dothan, Ala.—City has selected J. B. McCrary & Co., Empire Bldg., Atlanta, Ga., to design and supervise street paving.—H. W. Lisenby, Clerk.

Niles, Cal.—Representatives of the Chambers of Commerce from Pleasanton, Livermore, Sunol and this place are discussing the advisability of appealing to the Board of Supervisors for the construction of a boulevard road through Niles Canyon; Committee, headed by Assemblyman Thomas Silver, of Pleasanton, to outline plans and details for presentation to the Board, has been appointed.

Oakland, Cal.—Council has called for reports from the City Engineer and Superintendent of Streets as to the advisability of establishing a municipal asphalt plant; number of Council are in favor of plant similar to Dayton, O., or San Francisco plants; $10,000 is needed.

Oakland, Cal.—The City Engineer has been directed to prepare plans and specifications and submit an estimate of cost for paving 19th, William and 20th sts. from San Pablo ave. to Telegraph ave.; 21st st. from Grove to Telegraph ave.; Jones st. from Telegraph ave. to San Pablo ave.; Broadway from 20th st. to Piedmont ave.; Webster st. from 12th st. to Broadway; 19th st. from Telegraph ave. to Jackson st.; 24th st. from Telegraph ave. to Broadway.

San Bernardino, Cal.—Council has created a new sidewalk district starting at B and 3d sts. and taking in H, 10th, G, I, 2d and 8th sts. and Kendall ave.; walks must be laid by August 1.

San Francisco, Cal.—The Board of Public Works has passed a resolution recommending the parking of Dolores st. throughout its entire length.

Denver, Col.—The Board of Public Works has adopted plans for paving work, estimated to cost $60,000; sandstone block will be laid on Market st. from 19th to 71st and on 20th, 21st, 22d and 23d sts.

Hartford, Conn.—Plans for State road work have been received by the State Highway Commissioner as follows: 10,000 lin. ft. on the Litchfield turnpike in the town of Woodbridge; 20,600 lin. ft. on the Litchfield and New Milford turnpike in the towns of Litchfield, Morris and Washington, and 17,000 lin. ft. on the Bridgeport and Easton turnpike in the town of Trumbull.

New Britain, Conn.—City has rejected all bids for the paving of Crown and Fair sts.; new bids will soon be asked.—C. W. Kelly, City Engineer.

Waterbury, Conn.—The Board of Aldermen has ordered crosswalks laid across Park ave. at Spencer ave., $20; across Sylvan ave. at Luke st., $80; across Rose st. in east line of Walnut and across Walnut in north line of Rose, $80 each; a water main was ordered laid on the Tower road from Randolph ave. to Blacknall st., $900, and receiving basins were ordered constructed on the west side of Wall st., $50; also sidewalks on Park ave. from Kingsbury st. to Sparks st. on both sides of Chapman ave. from Willow to Waterville sts., $500; on east side of Grant st. from Division to Griggs sts., $400; on Columbia blvd. from Pine st. to Randolph ave., $2,400; on Walnut st., from Ashley to Farm sts., $1,500; on Clark st., from extension of James st. to Washington ave., $1,250.

Lewes, Del.—Council will lay cement walks about the town and to the beach, where a number of cottages are being erected.

Washington, D. C.—Henry B. F. Macfarland, Henry L. West and William V. Judson, Commissioners, have approved recommendations of Engineer Department that W and U sts. S. E. be improved by setting bluestone curb on both sides, relaying cobble gutters and regulating surface of roadways with gravel; cost $1,100 each.

Washington, D. C.—An American consular officer in Latin America reports that the mayor of the city in which he is located has under consideration a plan for paving the streets with vitrified brick, and has requested him to furnish the names of firms in the United States exporting machinery used in the manufacture of this article. The consular officer suggests that American firms furnish the inquirer direct with all available information on this subject as soon as possible, and also send catalogues in duplicate to his office for reference purposes.—Address No. 3439, Bureau of Manufactures.

Bradentown, Fla.—Manatee County will vote June 22 on $250,000 bonds for constructing paved, macadamized or other hard-surfaced roads.—M. C. Davis, Chairman Board County Commissioners.

Tampa, Fla.—Citizens have defeated proposition to issue $480,000 bonds for public improvements, to be divided as follows: To complete paving now under way, $82,500; paving in annexed territory, $50,000; paving in old city limits, $22,500; sewers in new territory, $40,000; sewer in old city limits, $10,000; municipal hospital, $30,000; City Hall, $75,000, and for the Lafayette st. bridge, $170,000.

Atlanta, Ga.—J. H. Ewing has been appointed appraiser by the General Council to institute condemnation proceedings at once for the widening of three central business streets.

Wallace, Idaho.—City has rejected bids for the large amount of paving that was to be done.

Cairo, Ill.—City Engineer Thistlewood is making a survey of Commercial ave. below 20th st. for the purpose of finishing the estimates for paving that avenue all the way from 2d to 34th sts.

Cairo, Ill.—The Board of Local Improvement has adopted resolutions ordering brick pavements, under estimates by the Engineer, as follows: 21st and West 21st from Commonwealth ave. to Mississippi levee, $39,918.93; Elm st. from 24th to 30th st., $11,824.34; Walnut st. from Jefferson ave. to 3d st. to 28th and Holbrook ave., $74,492.30, and North Sycamore st. from 34th st. to city limits, $48,053.86.

Champaign, Ill.—City Engineer Morgan, Urbana, is preparing plans for paving of West Nevada st. and for West Clark st.

Fairfield, Ill.—Mayor D. H. M. Pitner is urging a system of paved streets.

Galesburg, Ill.—Council is considering the paving of Losey st. from Beecher ave. to Farnham st.

Kankakee, Ill.—Council has authorized the City Engineer to prepare estimates for the costs of paving East Court st. from Chicago ave. intersection to the city limits.

Lincoln, Ill.—Council has appropriated $3,500 for street repairs and improvements and for bridge repairs.

Naperville, Ill.—City is considering the laying of 35,000 sq. yds. of brick pavement.—P. E. Koehler, Mayor.

Quincy, Ill.—Council has adopted ordinances providing for sidewalks on north and south sides of Madison, east and west sides of 19th, Ohio, Jefferson, Jackson and 17th sts.

Elkhart, Ind.—The Board of Public Works has decided to improve Prairie st. from South Main st. to Lusher ave. with an oil macadam.

Indianapolis, Ind.—The Board of Public Works will soon receive bids for opening, extending and paving with asphalt St. Clair st., and for the grading and paving of the sidewalks with cement a uniform width of 5 ft. in portions of Vermont, Pine, Kennington, Lincoln, Noble, 10th, Clifford, Annetta and 42d sts.

Lagrange, Ind.—Town Trustees have adopted a resolution for constructing cement curbing on Poplar st.—Spencer E. Coplin, Town Clerk.

New Albany, Ind.—Bids for the improvement of Market st., from Pearl to State, including the Market Square, and for Shelby st., from East 11th to Cedar Rough pl., will be opened June 9; both thoroughfares are to be improved with vitrified brick, with granitoid sidewalks; on Market st. the cost of the granitoid sidewalk and 26 ft. of roadway on each side of the plaza, the city paying for the balance of the improvement, will be $7.78 per lin. ft.

Tipton, Ind.—Tipton County Commissioners will soon ask for bids for the construction of three miles of gravel road in Wildcat Township.—J. F. Barrows, County Auditor.

Washington, Ind.—Davies County has awarded $62,375 road bonds to Breed & Harrison at par.

Mt. Pleasant, Ia.—Council has voted to pave Washington, Jefferson, Main and Monroe sts. with brick.

Muscatine, Ia.—Paving extensions totaling more than thirty blocks and the construction of a combined storm water and sanitary sewer, exceeding 12,000 feet in length, in sub-sewerage district No. 3 of main sewerage district No. 3, have been authorized by Council.

Wellington, Kan.—The city will receive bids until June 23 for approximately 47,000 sq. yds. of paving and 12,200 running feet of combined curb and gutter.—Fred Humes, City Engineer.

Wichita, Kan.—Plans are being prepared by City Engineer B. C. Wells for a 40-ft. roadway to be paved with asphalt or bitulithic, 1½ miles; also for 12,000 sq. yds. of asphalt paving.—William Sentz, City Clerk.

Danville, Ky.—Council has passed ordinance providing for laying of 10 miles of concrete paving and curbing during summer.

Newport, Ky.—Council has authorized a vote on the $100,000 bond issue for street improvements.

New Orleans, La.—City has decided to pave Erato st.—W. J. Hardee, City Engineer.

New Orleans, La.—Property owners on Octavia st. have petitioned for the paving of that street from Freret to South Robertson st.

Baltimore, Md.—The Board of Public Improvements has approved ordinances providing for the improved paving of Howard st. between Madison and Centre sts.; Friendsbury pl. between Windsor, Mill road and Preston st., and Stag alley between Lexington and Marion sts.

Baltimore, Md.—City Solicitor Poe will soon begin the work of preparing the South Baltimore grade crossing ordinance, having been ordered to do so by the Board of Estimates.

Bel Air, Md.—The State Good Roads Commission has ordered a survey, east from Kalmia, for two miles of permanent road in Harford County.

Havre de Grace, Md.—The Street Improvement Commission has accepted plans and specifications by Walter W. Crosby, Chief Engineer, State Roads Commission, Baltimore, for street improvements; estimated cost $22,000.

Kensington, Md.—Town Council has authorized Mayor Cannon to have Connecticut ave. graded, preparatory to putting down a macadamized roadway, 15 ft. wide, the entire length of that street.

Gloucester, Mass.—Council has decided to widen and relocate East Main st. from Brazier to the Gate Lodge.

Lawrence, Mass.—Bids will be called soon on the paving of Water st.; specifications have been prepared.—A. D. Marble, City Engineer.

South Framingham, Mass.—The Finance Committee has recommended that a committee of citizens purchase a stone crusher at a cost of $1,500.

Detroit, Mich.—Council has directed the Department of Public Works to advertise for proposals for paving Commonwealth ave. with sheet asphalt, cost $19,149; also Dearborn ave. with cedar blocks, $21,150; also Hamilton ave. with cedar blocks, $7,191.—J. J. Haarer, Commissioner.

Frankenmuth, Mich.—Citizens have voted in favor of issuing $7,000 of bonds for constructing good roads.

Grand Haven, Mich.—Bids will be received very soon for constructing 13,000 yds. of Westrumite or brick paving on Washington st. from the dock line to 5th st.—Jacob Glorum, City Clerk.

Kalamazoo, Mich.—Estimates for cement combined curb and gutter for Lake st., Potter st., West Main and South West sts. and Stuart ave. are being prepared by City Engineer Johnston.

Manistee, Mich.—The city will pave, by day labor, 5,400 yds. with brick on concrete with tar or asphalt filler; bids are wanted on material on or before June 15, 1909.—Geo. B. Pike, City Engineer.

Manistee, Mich.—Thirteenth and Main sts. will be paved with brick by day labor under supervision of City Engineer Geo. B. Pike.

Alexandria, Minn.—Bids will be received for constructing cement sidewalks and crossings.—C. J. Sundblad, City Clerk.

Duluth, Minn.—Property owners have voted that 29th ave. west should be paved with tar macadam on a concrete base; total cost, including sewering, $9,000.

Duluth, Minn.—City has decided to pave Superior st. from 25th ave. west to 30th ave., west; the paving of 1st and 2d sts. is also being considered.

Fergus Falls, Minn.—Council has ordered the construction of $6,000 worth of sidewalks and ten crosswalks for each ward.

Renville, Minn.—Council has ordered the construction and repairs of gravel and cement sidewalks.

St. Louis, Mo.—The Board of Public Improvements has approved ordinances calling for expenditure of $408,340 for street paving; streets include Jefferson ave., cost $76,683, and Gravois ave., cost $62,603.

Omaha, Neb.—The Burt st. hill at 24th will be cut down this summer and 24th st. will be opened to traffic before fall, making this the longest street in the city; 24th runs from Florence to South Omaha with only one turn, at St. Mary's ave.; cut 1,200 ft. long will be made through the hill, the cut to be 35 ft. deep at its deepest point; street will be 50 ft. wide and 26,000 cu. yds. of earth must be moved; Council expects to secure bids at a figure considerably less than 20c. per cu. yd., but to be on the safe side $6,000 has been set aside for the work.

Laconia, N. H.—Council will decide to appropriate $2,000 for the completion of the section of the Merrimack valley State road that is within the city limits.

Avalon, N. J.—All the interests along Seven-Mile Beach are uniting to push the plan for broad thoroughfares connecting them, and are endeavoring to induce the County Freeholders to construct a road across the meadows to the mainland, as the only means of connection now is the mile-long railroad bridge across Townsend's Inlet.

Burlington, N. J.—As an experiment in road preservation, city officials have given a section of macadam highway on Broad st., in East Burlington, an oil dressing; if the test proves satisfactory use of the oil

will be adopted on other thoroughfares.

Camden, N. J.—Committee of the Eighth Ward Improvement Association will urge the paving of Woodland ave.

Cape May, N. J.—County this year will receive $4,000 from the State auto fund for the improvement of County roads.

Collingswood, N. J.—Mayor Collings has recommended the improvement of several streets that are built up but unimproved and the purchase of a road roller.

Morristown, N. J.—The Board of Freeholders has rejected all bids received for road repairs in the seven sections.

Paterson, N. J.—The Board of Works has passed the permanent street improvement ordinance providing for the improvement of the following streets: Carroll st. from Park avenue to Market st., with wood blocks; Dale ave. from Grand to Ward sts., with asphalt; East 18th st., from Broadway to Park ave., with wood blocks; Fair st. from Auburn street to the Erie railroad, with asphalt, and from the Erie railroad to Paterson st., with granite block; North Main st. from East Main st. to North straight st. to be paved with asphalt; Ramapo ave., with granite block, and Totowa ave. from Albion ave. to Paterson ave., with wood block; Bridge st. from Broadway to the Passaic River, with wood block, and Goodwin st. from Washington st. to Paterson st., with asphalt.

Ballston Spa, N. Y.—F. H. Owens, of Sandy Hill, an inspector of highways, is making arrangements to repair the State road between this village and Saratoga Springs; road will be swept and sprinkled with oil, after which half an inch of sand will be put on; if this method of repairing the highway is successful other State roads will be treated in the same manner.

Brooklyn, N. Y.—The Board of Estimate has authorized the following improvements: Grading, curbing and paving with asphalt, East 5th st. from Ave. D to Ditmas ave.; cost, $10,700; paving with asphalt 74th st. from Fort Hamilton ave. to 10th ave., $6,800; paving with asphalt East 31st st. from Newkirk ave. to Clarendon road, $8,500; paving with asphalt 10th ave. from 79th st. to 86th st., $20,800; paving with asphalt Foster ave. from East 14th st. to East 17th st., $7,800; paving with asphalt 55th st. from 6th ave. to 7th ave., $5,700; paving with asphalt East 4th st. from Church ave. to Ave. C, $9,500; paving with asphalt 14th avenue from 75th st. to 79th st., $12,300, and paving with asphalt East 28th st. from Clarendon road to Newkirk ave., $8,700.

Canandaigua, N. Y.—According to the report filed with Division Highway Engineer Starr, of Syracuse, the bulk of money allotted this division for highway repairs will be expended in the counties of Ontario and Chenango; County has been apportioned $160,000 for the repairs of its highways.

Fulton, N. Y.—The Board of Public Works has passed resolutions authorizing the building of practically all the sidewalks for which applications have been made.

Hoosick Falls, N. Y.—City has rejected all bids received for purchase of $50,000 grading and paving bonds.

Little Falls, N. Y.—Again the East Main st. paving must be advertised; Warren Bros. cannot give a ten-year guarantee, but will give a five-year guarantee; company promised to submit the same bid as before with five-year guarantee and the Board voted to readvertise.

New York, N. Y.—Bids will be received June 8 by Comptroller Metz for $2,000,000 bonds for street improvements.

Niagara Falls, N. Y.—The City Engineer has returned the following estimates: For paving Evershed st., $4,413.75; 10th st. from North ave. to Ontario ave. and to Lockport st., $17,521.80; 7th st. from Niagara st. to Walnut and to Pine, $19,034.60; 12th st. from Niagara st. to Walnut ave., $14,225.20; Spruce ave. from Cedar pl. to Main st., $4,816.64, and Cedar pl. from Cedar ave. to Spruce ave., $2,132.

Niagara Falls, N. Y.—The Board of Public Works has advertised for bids, returnable June 1, on the paving of Whirlpool st. from Bath to Chasm ave. and for a pavement on Ontario ave. from Lockport to 22d st.

Oneida, N. Y.—City is considering the paving of Warner st. with vitrified block.—Geo. S. Tibbits, City Engineer.

Poughkeepsie, N. Y.—The Board of Public Works has decided to pave Catharine st. from Main st. to Mill st. and North Hamilton st. from Main to Mill sts. with vitrified brick; also to improve Union, Pine and Duane sts. and Gifford ave.—R. J. Shields, Clerk.

Riverhead, L. I., N. Y.—The State Highway Commission has planned for the laying of an asphaltum binder for the top course in building the State road between Huntington and Amityville, which will necessitate an increased cost of $6,200.

Schenectady, N. Y.—Plans are being prepared by City Engineer Chas. W. Trumbull for grading, curbing and paving Campbell ave.; bids will be received very soon.

Utica, N. Y.—City Engineer O'Brien has presented plans and specifications for paving Shaw st. from Genesee st. to Sunset ave. and Mary st. from Nichols st. to Jefferson ave.; plans were approved and the Secretary has been directed to advertise for bids.

Williamsville, N. Y.—D. Krehbiel, Chairman of the Good Roads Committee of this village, has announced that the State Highway Commission has decided to pave Main st. with brick.

Goldsboro, N. C.—Citizens will vote June 14 on $150,000 bonds for street and sidewalk improvements.

Ada, O.—City will let contracts soon for 24,000 sq. yds. of paving and one-half mile of macadam road with curb.—Thos. J. Smull, Engineer.

Akron, O.—Council has passed ordinances providing for the paving of Maple, North Howard, Arch, Allyn sts. and Dodge ave.

Ashtabula, O.—Mill and Strong st. property owners have petitioned Council for a sewer.

Columbus, O.—The Service Board has instructed Secretary Edward Hirsch to place the advertisements at once for the improvement of thirty-one streets in as many parts of the city.

Columbus, O.—Bids will be received by the Board of Public Service, June 9, noon, for grading and paving with brick or other substantial material, setting 5-in. curb, sub-drains and catch basins; 23 contracts; $500 check with each job.—E. W. Hirsch, Secretary.

Columbus, O.—The Trustees of the Sinking Fund have awarded $50,000 grade crossing bonds to the Union Savings Bank and Trust Co., Cincinnati, at a premium of $1,770, and $118,000 street improvement bonds to Rudolph Kleybolte & Co., Cincinnati, at a premium of $15,591.90.

Dayton, O.—Mayor Burkhart has signed the $20,000 bond ordinance for the repair of streets.

Dayton, O.—City Engineer Cellarius has estimated cost of paving Liberty st. from Monument ave. to the levee at $2,113.40 for brick and $2,355 for asphalt.

Hamilton, O.—Council has decided to pave South 5th st. from Henry st. to Central ave. with sheet asphalt, vitrified brick, bitulithic or bituminous macadam.

Lima, O.—Bids will be received June 2, noon, for the grading and paving of twelve thoroughfares.—L. L. Crumrine, Secretary, Board of Public Service.

Massillon, O.—Council has decided to improve North Mill st. from North to East Cherry st. by paving with brick paving block, and also Locust st. from East Main to Wellman sts. with the same material.

Piqua, O.—Council has decided to improve Camp, Boone, North, Green and Downing sts., Park and Rundle aves. by paving.—J. R. Miles, Clerk.

Toledo, O.—Council has passed ordinances for the paving of Parkwood, Winthrop to Delaware; Ashland ave., Adams to Collingwood, by repaving, and Kent pl. from Scottwood to Parkwood, by paving.

Youngstown, O.—Bids will be received June 21, 2 p. m., for $26,000 bonds for paying the city's portion of the cost of street improvements, and the following paving bonds: $4,620, Bryson st. and Parkview ave.; $7,285, Delason ave.; $7,000, Fruit st., and $750, Whitney ave. grading bonds.—W. I. Davies, City Auditor.

Guthrie, Okla.—Council has passed resolutions ordering over a mile of paving on East Washington ave., North Maple, Oak and Walnut sts.

Ashland, Ore.—City will lay about a mile of bitulithic pavement; cost, $75,000.

Salem, Ore.—City will ask bids at once for the paving of Court st.; cost, $40.000.

Altoona, Pa.—The Board of Public Works has decided to repair 11th and 12th sts. with asphaltum.—City Engineer Engstrom.

Butler, Pa.—The County Commissioners have petitioned Court for the approval of a $20,000 bond issue to be used in paying the County's share of improving the roads.

Carbondale, Pa.—Council has received report of the Streets Committee on their recent inspection of the streets; report calls for about 150 jobs, including the repaving of Main st. from Salem to Lincoln aves., and of Salem ave. from North Church st. to the bridge; City Solicitor has been instructed to draw up the necessary ordinances.

Clifton Heights, Pa.—Citizens are discussing the building of new highways and the reconstruction of the old ones.

Connellsville, Pa. — A comprehensive scheme of relieving the congestion of traffic in North Pittsburg st. and meeting new conditions which will arise as a result of the erection of the new Federal building in Apple st. is being considered by the Street Committee of Town Council.

East Washington, Pa.—The borough will receive bids June 4, 7:30 p. m., for grading and paving with vitrified brick of North Wade ave., from McKennan ave. to the eastern line of Morgan ave.—John I. Carson, Secretary of Council, Brown Bldg., Washington, Pa.

Harrisburg, Pa.—Selectman Snavely has introduced an ordinance in Councils for the paving of Front st. from Calder to Kelker with sheet asphalt, the curbing to be steelbound granolithic.

Hazleton, Pa.—Council has passed an ordinance instructing City Engineers to advertise for bids for the paving of Laurel st.

Johnstown, Pa.—Mayor Wilson has recommended the paving of either Valley pike or Ash st. and the completion of paving on Maple ave.; also that $100,000 bonds be issued for street improvements.

Johnstown, Pa.—Civil Engineer Samuel G. Fetterman and John McCormick, of this city, and William Tierney, of Ebensburg, have viewed the site for a highway to connect the two roads which fork from the Puritan schoolhouse, both eventually reaching the Frankstown road; proposed road is 1,624 ft. in length, of easy grade, and the cost of construction will not be very large; it will require a short bridge across Trout Run, a few hundred feet below the proposed dam to supply Portage with water, and a tile culvert over a spring run.

Linvale, Pa.—A survey of the road between Ringoes and Linvale has been ordered for the purpose of macadamizing it; when completed this will make the connecting link between Philadelphia and northern New Jersey for automobiles.

New Castle Pa.—Citizens are agitating the reconsidering of the $100,000 bond issue for paving and sewering voted down a year ago.

Pittsburg, Pa.—Bids will be received May 28, noon, for furnishing 300,000 gallons of liquid asphalt road oil, to be delivered to any railroad points in Allegheny County, for the use of the road department.—R. J. Cunningham, County Controller.

Somerset, Pa.—Citizens have voted on the question of increasing the indebtedness of the borough by a bond issue of $25,000 for the purposes of street paving.

Sugar Notch, Pa.—Citizens have voted to increase the borough's indebtedness by $40,000 to pave Main st.

Tarentum, Pa.—Citizens will petition Street Commissioners for the paving of Garfield st. and other streets.

Versailles, Pa.—Council will soon call for bids for the improvement of Walnut st.

Wilmerding, Pa.—Council is considering the grading and paving of Card and Middle aves., Sprague, Florence, Lidel, Brown and Bridge sts.

East Providence, R. I.—The State Board of Public Roads will construct a State road from Ingraham corners to and around Moore's Corners to Pawtucket ave., where the new road begins.

Beaumont, Tex.—City has decided to construct 20,000 sq. yds. street paving, vitrified brick on asphalt paving, and concrete curbing.

Cleburne, Tex.—Johnson County is considering the issuing of $150,000 bonds for road improvements in First District.

El Paso, Tex.—Plans and specifications have been prepared for the Valley road, to extend from Ysleta to Fabens and from the city limits to New Mexico line.

Fort Worth, Tex.—The Tarrant County Good Roads Association will ask for a $1,000,000 bond issue.

Gainesville, Tex.—Citizens of Cooke County will vote June 26 on $100,000 bonds for road improvements.

Galveston, Tex.—Commissioner of Streets Austin has submitted a most important document relative to the paving of Broadway; the recommendation is that this greatest of Galveston streets be paved, to start with, from 13th to 31st sts, with the street car tracks placed together in the center and esplanades on either side, as at present on 25th st., and as has been decided upon for Broadway west of 41st st.; cost, $76,346.69.

Granbury, Tex.—Citizens of Hood County will vote June 26 on $80,000 bonds for road improvements.

Houston, Tex.—Contract will soon be let for four miles of street grading, one mile of street paving, one mile of cement sidewalk and clearing for same, amounting to about 30 acres.—L. Bryan & Co., 317½ Main st.

Longview, Tex.—A call for an election to issue $40,000 bonds to pave the business streets of Longview has been ordered.

Paris, Tex.—Assistant Attorney General J. D. Sluder has approved the $25,000 street improvement bond issue.

Wichita Falls, Tex.—Citizens have voted $20,000 bond issue for street paving.

Mount Pleasant, Utah.—The Commercial Club has decided to lay cement sidewalks.

Salt Lake City, Utah.—Council has authorized paving extensions; cost $150,000.—L. C. Kelsey, City Engineer.

Charlottesville, Va.—Albemarle County Commissioners are considering the construction of roadway over mountain.—P. St. J. Wilson, State Highway Commissioner, Richmond.

Emporia, Va.—Citizens of Greenesville County have voted $80,000 bonds for road improvements.

Norfolk, Va.—The Berkley Ward Improvement Committee has recommended to Councils the appropriation of $3,500 for curbing and guttering Berkley and Poplar aves. and $1,700 for paving 1st st.

Norfolk, Va.—The Local Board of the Seventh Ward has decided to ask Council for an additional bond issue of $60,000 for the Seventh ward; money to be expended in street improvements and in perfecting the sewerage system.

Richmond, Va.—The International League of Highway Improvement has adopted a bill asking Congress for an appropriation of $1,000,000 to support the work of the body through eight Commissioners to be appointed by President Taft.

Winooski, Vt.—The Village Board of Trustees, including the Village President, has made a tour of the streets and highways lying within the corporation limits, with a view toward laying out a programme for summer work on the streets and roads; a permanent road will be built extending from the Central Vermont railway tracks to Union street on Malletts Bay ave.

Everett, Wash.—County Commissioners will ask at once for bids for the construction of the first mile section of the Mukilteo-Everett road.

Hillyard, Wash.—Council has passed a resolution providing for the paving of Wall and Sheridan sts.

Puyallup, Wash.—City will spend $65,000 for street improvements.

South Tacoma, Wash.—Business men will petition Council for the paving of Union ave. from 52d st. to 58th st.

Spokane, Wash.—Plans are completed for grading, curbing, parking and sidewalking 22d ave., Browne to Bernard sts.; cost, $2,550; also, for sewering the alley between Boone, Gardner, Maple and Elm sts.; estimated cost, $2,253; plans are also completed for grading, curbing, parking and sidewalking of Scott st., 3d to 5th aves., the work to be done by private contract, under the supervision of the Board of Public Works.

Spokane, Wash.—Plans have been completed for paving with oiled macadam, Perry st. and Newark ave., from Ivory to 18th ave.; estimated cost, $30,000; Council has instructed the Board of Public Works to have prepared plans and specifications for paving with asphalt Division st., from Boone to Carlisle aves., and from Carlisle to Buckeye aves.

Wenatchee, Wash.—Citizens have voted bonds for street improvements.

Kenova, W. Va.—Citizens will vote on $40,000 bonds for street paving.—W. B. Morris, Mayor.

Thomas, W. Va.—City has decided to pave East ave. and macadamize Spruce st.; $20,000 is available.—George Martin, Mayor.

Antigo, Wis.—The Board of Public Works has recommended paving of ten blocks; cost $25,000.

Beloit, Wis.—The Board of Public Works will purchase a car of vitrified paving brick at the best terms possible, same to be used for crosswalks.

De Pere, Wis.—The Paving Committee, after looking over pavement in other cities, will recommend the use of cement concrete.

Milwaukee, Wis.—City has awarded $375,000 4 per cent street bonds to R. L. Day & Co. at $101.089.

Barrie, Ont., Can.—Special Committee has reported in favor of submitting a by-law to raise $30,000 by debentures for sidewalks and sewers.

St. Boniface, Man., Can.—The City Engineer has drawn up an extensive programme of local improvements; cost, $25,000.

Vancouver, B. C., Can.—The Board of Works will construct 40 miles of concrete sidewalks, pavements and sewer extensions this year; estimated cost, $70,000.

BIDS RECEIVED AND CONTRACTS AWARDED

Bessemer, Ala.—P. H. O'Brien, of Bessemer, has secured contract for 15,837 sq yds. brick pavement for $25,973, at $1.64 per sq. yd.—P. Lacey, City Engineer.

Tuscaloosa, Ala.—Bids for the paving work to be done on Queen City ave., 9th st. and a part of 22d ave. were invited and there was one submitted, this being by the Tuscaloosa Concrete Co., as follows: 89c. per sq. yd. for walk, 36c. per lin. ft. for curb and 35c. per cu. ft. for excavation and filling; bids were then declared formally rejected, after which Council took the matter up with the Concrete Co. and the contract was awarded to the company at the following figures: 87½c. per sq. yd. for walk, 36c. per lin. ft. for curb and excavation and filling free of charge.

Little Rock, Ark.—City has awarded contract to Memphis Asphalt & Paving Co., Memphis, Tenn., at $1.36 per sq. yd., for resurfacing of West Markham st. with asphalt.

Oakland, Cal.—Two bids were received by Council for paving Piedmont ave., one from the Barber Asphalt Co. and the other from the Ransome-Crummey Co.; the bids were referred to the Street Committee; they are very close, differing slightly on the various items of paving, so that figuring will be necessary to determine which is lowest; the pavement is to consist of a 6-in. base of concrete, 2-in. binder course and 1½-in. wearing surface of asphalt.

Oakland, Cal.—Fourth ave. from East 18th st. to Clinton st., some ten blocks in length, is to be paved with 7 ins. of asphalt macadam at once; East 18th st. from Lake Shore blvd. to 4th ave. will be similarly paved; private contract has just been let to the Ransome-Crummey Co. for this work.—Walter C. Howe, Superintendent of Streets.

Pasadena, Cal.—Contracts have been awarded as follows: Concordia ct., oiling, to D. C. Howard, $41.90; Grand ave., oiling, to B. F. Ford, $169.90; Mercantile pl., oiling, to D. F. Howard, $50.54; Washington st., oiling, to D. C. Howard, $480; Rowland la., oiling, to B. F. Ford, $52.38.

Hartford, Conn.—The Armory and Arsenal Committee has received bids as follows for sundry work in connection with the State Armory: Edward Balf Co., Hartford, macadam walks, grading, etc., $22,736; Alfred Farley, Hartford, street curbing, concrete walks, etc., $9,080; F. B. & W. H. O'Neil, Hartford, repairing river wall and laying new coping, $7,297; Alfred Farley, new iron fence, $665; Curtis & Dean, Hartford, two bridges, loading platform and steps, $8,934; New York, New Haven & Hartford Railroad, spur track and lumber, $2,175; Hartford Electric Light Co., lights, etc., $1,990.

Hartford, Conn.—State Highway Commissioner James H. Macdonald has awarded five contracts for State road work; this is the first letting of contracts this season.

The first contract called for the construction of 14,712 lin. ft. of macadam and Telford road in the town of Enfield and the Hartford and Springfield turnpike. The successful bidder was Amos Bridges' Sons, of Hazardville. Their bid was as follows: Macadam, $1.92 per lin. ft.; Telford, $2.89 per lin. ft.; cobble gutters, 48c. per sq. yd.; other bidders and their bids were: A. B. Ambrosia & Co., of Hartford, $2.95 per lin. ft. for macadam, $3.42 per lin. ft. for Telford, and 53c. per sq. yd. for cobble gutters; Connecticut Contracting Co., of New Britain, $2.24 per lin. ft. for macadam, $3.19 per lin. ft. for Telford, and 50c. per sq. yd. for cobble gutters; Pierson Engineering & Construction Co., of Bristol, $2.40 per lin. ft. for macadam, $3.30 per lin. ft. for Telford, and 60c. per sq. yd. for cobble gutters.

The second contract called for the construction of 15,645 lin. ft. of macadam and Telford road in the town of East Windsor. This piece of road and the one in Enfield are practically the only uncompleted sections in the trunk line running from Portchester, N. Y., through New Haven, Hartford and to Springfield. The successful bidder and his bid were Thomas Kearney, of Meriden, $1.78 per lin. ft. for macadam, $2.65 per lin. ft. for Telford, 75c. per lin. ft. for rubble drain, 30c. per lin. ft. for ralling and 80c. per sq. yd. for cobble gutters; other bidders were: O. T. Benedict, of Pittsfield, Mass., $1.93 for macadam, $3 for Telford, 85c. for rubble drain, 30c. for railing and 75c. for cobble gutters; Pierson Engineering & Construction Co., of Bristol, $1.90 for macadam, $2.70 for Telford, 60c. for rubble drain, 40c. for railing and 60c. for cobble gutters; B. D. Pierce, Jr., Co., of Bridgeport, $1.93 for macadam, $2.85 for Telford, $1 for rubble drains, 60c. for railing and 79c. for cobble gutters; Connecticut Contracting Co., of New Britain, $2.09 for macadam, $3.18 for Telford and 50c. for cobble gutters; A. B. Ambrosia & Co., of Hartford, $1.68 for macadam, $3.37 for Telford and 43c. for cobble gutters.

The third contract calls for the construction of three sections of gravel and gravel Telford road on the Waterbury road in the town of Middlebury, aggregating 5,300 lin. ft., and for one section of grading on Tucker's Hill for a distance of 300 ft. The successful bidder was the Pierson Engineering & Construction Co., of Bristol, which offered to do the entire work for $5,303.50; other bidders were A. Brazos & Sons, of Middletown; Goodman & Trumbull, of Litchfield, and Edward McManus, of Waterbury.

The fourth contract was for the construction of 2,600 ft. of macadam and Telford road on the Middletown turnpike in the town of North Haven. The contract was awarded to C. W. Tryon, of Meriden, who bid as follows: $1.89 per lin. ft. for macadam, $2.45 per lin. ft. for Telford and 50c. per lin. ft. for railing; other bidders were R. B. Davis, of Hartford, and Lawrence Bruce, of North Haven.

The contract for the construction of 1,275 ft. of gravel road in the town of Washington was awarded to C. W. Tryon, of Meriden, who offered to build the road at $1.70 per lin. ft. and to construct what masonry wall is necessary for $4.50 per cu. yd.; other bidders were Goodman & Trumbull, of Litchfield; A. Brazos & Sons, of Middletown, and the B. D. Pierce, Jr., Co., of Bridgeport.

Pensacola, Fla.—Bids for the hardening of the following streets have been rejected by the Board of Works: 9th ave. from Intendencia to Gregory sts., W. R. Taylor & Co., $2,447.75; Chas. W. Merritt, $2,000; Reus st., from Garden to Gregory, W. R. Taylor & Co., $849.85; Charles W. Merritt, $900; Spring st., from Gregory to Gonzalez, W. R. Taylor & Co., $3,128.90; Chas. W. Merritt, $2,400; Intendencia st., from Baylen to Barrancas ave., Chas. W. Merritt, $4,700; C. H. Turner Construction Co., $12,190.

South Jacksonville, Fla.—The Board of County Commissioners, May 14, awarded the contract for constructing one mile of concrete roadway from South Jacksonville to Pablo Beach to the Logan Coal & Supply Co., at $1.02 per sq. yd.

Tampa, Fla.—Hillsboro County Commissioners have awarded following contracts for extending paving of Grand Central ave. to Fraziers Beach: W. A. Cook for three-quarters of mile of vitrified brick paving at $1.27 per sq. yd. and for curbing at 43c. per lin. ft.; B. Whitehurst at 37c. per sq. yd. for two and one-quarter miles shell road; total of 7,920 ft. of granite curbing; both contractors of this city.

Atlanta, Ga.—The General Council settled the brick question by adopting a minority report from the Street Committee, which allows the contractor for laying sidewalk pavement to use any brick that comes up to the specifications and meets the approval and inspection of the City Engineer.

This means that the shale brick is knocked out and that the property owners will not have a choice of brick. There was a majority report from the Street Committee which called for the using by the contractor of shale brick which had been adopted at a former meeting of Council. The Southern Tile & Stone Co. has been awarded the contract for laying the brick sidewalks for the city for the year.

Savannah, Ga.—City has awarded contract to Barber Asphalt Paving Co., Philadelphia, Pa., at $1.15 per sq. yd., for 100,000 sq. yds. of paving, with privilege of ordering 50,000 more yds. at same price.

Elgin, Ill.—The Board of Local Improvements has let the contract for the Dundee ave. pavement construction to the McCarthy Improvement Co., of Davenport, Ia., at $60,300; contract has been awarded William A. Hillman for constructing cement sidewalk on National st. bridge.—Jerry Aubertus, Chairman Committee on Sidewalks.

Elkhart, Ind.—The Andrews Asphalt Paving Co., of Hamilton, O., and the Cain Construction Co., of Gary, Ind., were the only bidders for the Princeton street paving contract when the Board of Public Works opened the proposals May 26. The Cain Company bid as follows: Molding city block, per sq. yd., $2; metropolitan block, $2.01; sheet asphalt, $2.02; combined cement curb and gutter, per foot, 45c.; corner curb, 37c., and corner gutter, 35c.; headers, 40c. a foot; catch basins, $35 each; manholes, $35 each; inlets, $10 each.

The Andrews Company's bid was: Metropolitan block, asphalt filler, per sq. yd., $1.94; same with tar filler, $1.89; same with concrete filler, $1.84; sheet asphalt, $1.96; combination curb and gutter, per foot, 44c.; corner curb, 30c.; corner gutter, 35c.; headers, 30c.; catch basins, $45; manholes, $50; inlets, $25.

The engineers' tabulation of the proposals gave the following results:

Cain Co.—Molding city block, $17,682.01; metropolitan block, $17,754.86; sheet asphalt, $17,827.71.

The Andrews Co.—Metropolitan block with asphalt filler, $17,641.20; same with tar filler, $17,276.95; same with cement filler, $16,912.70; sheet asphalt, $17,786.90. Chairman Arnold has announced that the award would not be made until after a conference with G. A. Briggs, a member of the board who was not present, and that the property owners would have ten days, exclusive of Sundays, in which to express their choice in writing for one of these kinds that had been bid on for something else, and that nothing further could be done before that time.

Greenfield, Ind.—Bonds have been sold for the construction of a brick roadway

in State st. entirely through this city, north and south, about two miles; J. J. Kelleher, of Frankfort, has the contract.

Des Moines, Ia.—The Bryant, Ford & McLaughlin Asphalt Paving Co., of Waterloo, has secured the contract for paving about 50,000 yds. with asphalt on West 5th st.; bid was $1.99 per sq. yd. between Assencion and University sts. and $2.09 from Forest to Carpenter sts.; bids were opened May 10.

Sioux City, Ia.—The Ketle Rivers Quarries Co. was given the contract for paving with creosote blocks, Nebraska st. from 3d to 4th, at $2.80 a sq. yd.; the Bryant Ford McLaughlin Co. got the contract for resurfacing with asphalt Pierce st. between 5th and 6th at $1.45 a yd.; the Barber Asphalt Co. bid $1.49½ a yd.; the former company was also given the contract for resurfacing Pearl st. from 4th to the Perry Creek bridge at $1.45 a yd.

Louisville, Ky.—The Board of Public Works has awarded contracts for the laying of new sidewalks with granitoid on both sides of 3d ave., between Breckinridge and St. Catherine, and on the west side of Brook st., between Broadway and Jacob, to the Fruin-Colnon Company, who were the lowest bidders. The estimated cost, which is to be paid by abutting property owners, is $3,000.

Louisville, Ky.—The Board of Public Works has awarded a contract to R. Lee Figg to build a new sidewalk around the Annex to the City Hall; he was the lowest bidder, at $1 a sq. yd. for granitoid and 60c. for excavation. The work is to be done at once.

The Board also opened bids of 64 other pieces of sidewalk work, but the awards will not be made for several days as it will take time to figure out the lowest bidders.

Louisville, Ky.—The lowest of ten bidders for constructing part of the underpass for the L. & N. Railroad to eliminate grade crossings on Oak st. between 8th and 9th sts., was Trippeer & Co., of Peru, Ind., and this firm will most likely get the award; the work is to begin at once. The estimated cost of the work which was let is about $55,000, but the whole work will cost over $100,000 including the rights-of-way and damages to adjacent property. The L. & N. is to bear half of the cost of the work. The prices sent in yesterday were low, probably on account of the abundance of labor and the price of materials for doing such work. There were ten bidders in all. Aside from the low bid of Trippeer & Co., sealed proposals were received from the following contracting firms: W. H. McGovern & Co., of Chicago; the Terro-Concrete Construction Co., of Cincinnati; Henry Bickel & Co., of Louisville; W. F. Nugent & Bro., of Louisville; National Concrete and Construction Co., of Louisville; the Fruin-Colin Construction Co., of St. Louis; Marvin Blain, of Joliet, Ill.; the Marion Construction Co., of Marion, Ind.

Baltimore, Md.—Bids for roads, opened May 27, by the State Roads Commission, indicate that it will be impossible to construct macadam highways on the Eastern Shore of Maryland for less than from $7,000 to $10,000 a mile, as the crushed stone to be used will cost about $5,500 for the cheapest grade used. The price ranged from 75c. a sq. yd. for "Class A" to $1.33 for "Class B," one being for the usual macadam construction and the other providing for heavier stone to meet unusual requirements.

Among the bidders were the Juniata Construction Co. and the Filbert Paving & Construction Co., of Philadelphia, and the County Commissioners of Wicomico. There were probably 25 bids offered for the roads in the nine Eastern Shoe counties. Cecil County was the most popular, and the prices offered were more favorable to the State, due probably to the fact that stone is more convenient there for road building purposes. Included in the estimates prepared by Road Engineer Crosby were the grade excavations and fills, and also the pipe of different varieties and guard rails and masonry necessary to make a good road. It will be necessary to tabulate all the bids before the lowest can be determined; members of the Commission had hoped that roads could be constructed in some of the counties at least for $4,000 or $5,000 a mile. It was generally recognized, however, that the Eastern Shore roads would prove to be the most expensive, because of the scarcity of stone in that locality.

In Cecil County bids were offered for roads as low as 60c. for broken stone macadam, "Class A." This is due to its proximity to the supply of stone.

Towson, Md.—Bids were opened May 20 for improving 1st ave., between 8th and Chester sts., and for stone for the Old Court rd.; the Mallonee Bros. were the only bidders for stone, at $1.50 a ton; Patrick Reddington was the lowest bidder on the 1st ave. work, at $39,985.20 with bituminous filler and $38,425.20 with combination filler.

Boston, Mass.—The City Supply Department has closed a contract for 12,000 sq. ft. of North River flagstones with William E. Harvey, of 160 Callendar st., Roxbury; for the flagstone delivered at the city's wharf, Harvey, under the terms of the contract, will receive 34c. a sq. yd. The other bidders were: M. H. Cuddihy, 36c.; Austin Ford, 60c., and Maher Brothers, 67c.

Boston, Mass.—The State Highwey Commission has awarded a contract for building a section of State highway in the town of Ipswich, between Undercliff's corner and the Hamilton line, to James E. Watkins, of Amesbury; his bid was $6,589.70.

Boston, Mass.—The following bids were opened May 27 for constructing macadam roadways:

Benton st.—James Doherty, $1,913.85; D. E. Lynch, $2,314.30; F. H. Cowin Co., $1,885.21; J. McCourt & Co., $1,832.90; J. C. Coleman Sons Co., $2,204.25; William J. Barry, $2,050.25. Awarded to John McCourt & Co. Belfort st.—W. J. Rafferty & Co., $982.31; J. B. O'Rourke & Co., $863.91; D. E. Lynch, $1,085.75. Awarded to J. B. O'Rourke & Co. Covington st.—M. Darena, $2,591; J. B. O'Rourke & Co., $1,662.71; J. C. Coleman & Sons Co., $1,954; W. J. Rafferty & Co., $1,692.46; D. E. Lynch, $2,280.65. Awarded to J. B. O'Rourke & Co.

Everett, Mass.—A. E. Fletcher Co., West Chelmsford, Mass., has been awarded a contract for furnishing granite blocks for $1.40 per sq. yd. Other bids were: Simpson Bros., Boston, $1.43; Rockport Granite Co., Rockport, Mass., $1.54. T. & R. T. Lombard, Boston, was awarded a contract for furnishing 18-in. edgestones for 59c. per ft., 18-in. circles at 76c. per ft., and small corners at $2.50. Bids were received May 21 for vitrified paving brick as follows: J. W. Hahn, Johnsonbury, $29.90 per 1,000, 41 per sq. yd.; C. T. Willard, Kushequa, $29.75, 40 per sq. yd.; C. T. Willard, Clymer, $28.50, 42 per sq. yd.; Mack Mfg. Co., Mack, $29, 42 per sq. yd.; Eastern T. C. Co., Shawmut shale, $25.75, 44 per sq. yd.; Eastern T. C. Co., Shawmut fire clay, $26.75, 44 per sq. yd.; Met. Brick Co., Metropolitan, $32.50, 41 per sq. yd.

Bay City, Mich.—The Board of Works has recommended the awarding of the contract for building sidewalks this year as follows: First district, north of Columbus ave., Theodore M. Gaffney; second district, south of Columbus ave., John Dardas; third district, west side, Robert Bateson & Sons, all at 8½c. per ft.; the Dardas bid was for 8 3-4c., but the board cut it down to the others, the contractor consenting.

Alderman Zanley wanted to know why Gaffney was turned down in the second district, where his bid was for 8½c., and the contract given to Dardas, and Alex. Zagelmeyer, of the Board of Works, explained that the city was divided into three districts and the policy of giving the work to three contractors had been followed this year; the object was that the work might be more carefully looked after.

Lansing, Mich.—The following are the bids opened May 27 for paving Kalamazoo st. from Capital ave. to River st.; Fitzpatrick & Gordon, $11,600; McKale & Clark, $11,594; S. Champion, $10,900; Frank Farrell, $10,900; Kneal & Ryan, $10,125.

Menominee, Mich.—The Escanaba County Road Commissioners, consisting of John Gasman, Chairman; H. W. Reid, and Erick Anderson, has awarded 5,792 ft. of road in the village of Bark River to the Solid Rock Paving & Construction Co. for the sum of $4,190, being the lowest bidders.

Owosso, Mich. — Contract has been awarded to Thomas Watson, at $3,812, for paving West Main st. bridge (953 sq. yds.) with creosote blocks; work includes covering with creosoted plank and then with 3½-in. creosote blocks; plank to be treated with 16 lbs. and blocks with 20 lbs. of creosote; bids were opened May 17.

St. Paul, Minn.—Fielding & Shepley were awarded the contract for paving 4th st. with sandstone from Broadway to St. Peter st. by the Board of Public Works and the Assembly approved it; the contractors bid $26,700, the Engineer's estimate was $27,080, and the highest bid offered was one of $33,280, by O'Neil & Preston.

Belton, Mo.—The contract for constructing a macadam road from city to Jackson County line, distance of 2½ miles, has been awarded to C. W. Dobbins, of Pleasant Hill, for $8,740.

Grandview, Mo.—The Jackson County Court has awarded the contract for constructing the macadam road from Grandview to the county line, a distance of 3½ miles, to C. W. Dobbins, of Pleasant Hill, at $20,856.

Kansas City, Mo.—The Board of Public Improvements, May 11, awarded contracts for paving as follows: Parker, Washington Co., 2309 Penn ave., asphalt, Montclair st., $3,898; Hammett pl., $11,502; Catalpa st., $4,767; Page st., $4,653, and Rosalie st., $1,707. Barber Asphalt Paving Co., Colonial Security Bldg., with asphalt, Oak Hill, $11,998. Trinidad Asphalt Mfg. Co., 320 South 21st st., St. Louis, with asphalt, Vista st. between Boyle and Taylor sts., $19,727. Jas. T. McMahon, with brick, College st., $10,967; Farlin st., $4,988. Ruecking Construction Co., with brick, Vermont st., $9,680; Oregon st., $10,316; Bates st., $7,491; Bowen st., $2,184, and Manchester st., with bitulithic, between Sublette and Tamm, $35,051. Gilsonite Construction Co., with brick, De Soto st., $8,887; Frank A. Stiers, Howard st., with brick, $3,791. Wm. R. Bash Construction Co., with brick, Manchester st. between Prather and western city limits, $15,447. Granite Bituminous Paving Co., with bitulithic, Van Versen st., $13,196; Clay st., $11,824, and Vista st., $18,606, between Grand and Vanderventer st.

Nevada, Mo.—The County Court has let contracts for the construction of sidewalks leading to the Court House from the north, south, east and west, and also sidewalks leading around the Court House, to J. T. Smith, with Carthage limestones, for 19c. per sq. ft. for the larger portion, while P. Brophy was awarded the contract to construct the walk to the north approach, with Carthage limestone, at 15c. per sq. ft., and connecting walks of concrete will be built by H. Spohrer and L. Benz, at 11c. per sq. ft.

Omaha, Neb.—Nearly $250,000 will be expended in paving in Omaha this year, this amount being represented in one lot of paving contracts let by Council; twenty contracts were let, thirteen for new paving and seven for repaving, the total representing eighty-three blocks, or six miles. Most of the paving will be brick, though several of the contracts let are for asphalt paving. Hugh Murphy and Charles E. Fanning secured the bulk of the contracts, which total $241,045.

The contracts for repaving are as follows: 18th st., between St. Mary's ave. and Leavenworth st., one block, asphalt, Hugh Murphy, $7,925; 16th st., between Farnam and Douglas sts., one block, asphalt, Bryant, Ford & McLaughlin, $3,800; Grace st., between Sherman ave. and 24th st., eight blocks, brick, Charles E. Fanning, $24,950; 14th st., between Howard and Leavenworth sts., four blocks, brick, Hugh Murphy, $15,450; Leavenworth st., between 37th and 40th sts., three blocks, brick, Hugh Murphy, $15,950; Jackson st., between 16th and 19th sts., three blocks, brick, Charles E. Fanning, $5,925; 15th st., between Howard and Davenport sts, eight blocks, asphalt, Hugh Murphy, $2,200.

The contracts for new paving, all of which provide for curbing and guttering with either natural or Bedford stone, are as follows: Ames ave., between 25th and 36th sts., eleven blocks, brick, Charles E. Fanning, $41,950; Burdette st., between 21st and 24th sts, three blocks, brick, Charles E. Fanning, $7,275; 27th st., between Ames and Fowler aves., two blocks, brick, Hugh Murphy, $5,035; Fowler ave., between 25th and 30th sts., five blocks, brick, Hugh Murphy, $14,260; 28th st., between Parker and Franklin sts., two blocks, brick, Hugh Murphy, $5,870; 19th st., between Emmet and Pinkney sts., one block, brick, Hugh Murphy, $2,080; 29th st., between Cuming and Hamilton sts., six blocks, brick, Charles E. Fanning, $11,600; Fort st., between 24th and 30th sts., six blocks, brick, Hugh Murphy, $24,065; Meredith ave., between 25th and 30th sts., five blocks, brick, Charles E. Fanning, $14,670; Jones st., between 36th and 38th sts., two blocks, asphalt, Hugh Murphy, $5,870; Martha st., between 32d ave. and 34th st., two blocks, asphalt, Hugh Murphy, $7,035; 38th ave., between Dewey ave. and Pacific st., seven blocks, asphalt, Hugh Murphy, $19,050; 28th ave., between Cuming and Indiana sts., three blocks, brick, Charles E. Fanning, $6,125.

Bayonne, N. J.—The Boulevard Commissioners received bids, May 27, for the improvement of the Bayonne section of the county road. Proposals for reconstructing and rebuilding the roadway were as follows: Uvalde Asphalt Paving Co., $44,950; New Jersey Contracting Co., $39,525; Van Keuren & Son, $33,425; William Baker, $23,250, and Empire Contracting Co., $20,925.

The bids for constructing concrete curb and gutter and reconstructing, rebuilding and reinforcing the drainage system of certain sections of the Hudson Boulevard in the city of Bayonne were as follows: Commonwealth Roofing Co., $21,165; Adolph Eyferth, $17,641; Carrington Constructing Co., $16,828; Henry Hann, $15,007.50.

Bayonne, N. J.—Contract for the asphalting of 27th st., from Avenue A to Avenue E, has been awarded to the Warren Asphalt Paving Co., the lowest bidder, at the sum of $21,326.30.

East Orange, N. J.—Complaining that he had failed to get the kind of information he ought to have had from City Engineer Frederic A. Reimer, when he made his bids for the sale of road oils to the city, Benjamin F. Shakespeare, of the Pennsylvania & Delaware Oil Co., and a taxpayer

of this city, succeeded, May 24, in having all bids for the material rejected and an order made to readvertise under such specifications as would enable bidders to make their estimates on a common basis. The Council was all ready to adopt the recommendation of the Road Committee and award the contract to a rival concern when Mr. Shakespeare was heard.

The oils in question are known as asphalt oils and the Engineer had recommended to the Committee the make it had selected, because it had the proper ingredients and had given, so far as he was able to ascertain, the best results. The fact that the oil he recommended would cost the city 8½c. a gallon in carload lots, whereas Mr. Shakespeare had bid 3½c. on an oil of as good quality, but containing too small a percentage of asphaltum, had not been considered by the Committee, which was convinced that the oil it selected was the only one fit for its purposes. The Engineer had told Mr. Shakespeare that he wanted an oil running from 40 to 60 per cent with asphaltum ingredient, but did not tell him he was going to use an oil of a higher percentage in such cases as it would be required in the building of new roads. Mr. Shakespeare maintained that he could furnish as good an oil as the other at a lower price. It was decided that new bids be received on June 14 and that the bidders should submit propositions on specific amounts and fixed percentages of the asphalt ingredient and supply analyses as well.

Jersey City, N. J.—Bernard Gannon has been awarded the contract for the improvement of 18th st.; also for the improvement of 4th st.

Morristown, N. J.—Bids were received, May 24, by the Road Committee and the Director of the Board of Freeholders for road repair in the seven sections advertised for, and all were rejected. The seven sections include two in Morristown, South st. and Madison ave. The other sections are Madison ave., Morris township; Main st., Madison; Main st., Chatham; Mine Hill and Allen st., Netcong. These aggregate in all about six miles of road; bidders and their bids according to sections, are:

Section 1, South st., Morristown—Sands & Co., this city, without guarantee, $4,830.72; with three year guarantee, $6,005.76; Osborne Marcellus Co., regular material, without guarantee, $5,353.21; amasite, without guarantee, $5,483.89; Henry R. Edwards, amasite, with two year guarantee, 4-in. thick, $5,875.50; 3-in. thick, $4,896.25; M. E. Mulhall, city, regular, without guarantee, $5,550.50; with, $5,877; amasite, without, $7,183; Headley good road process, without, $6,530; J. B. Gougherty, city, without, $5,810.11.

Section 2, Madison ave., Morristown—Osborne Marcellus Co., Headley process, without, $7,456.53; amasite, without, $7,638.40; Sands & Co., city, with three year guarantee, $7,822; without, $6,414.04; J. B. Gougherty, city, without, $8,448; Osborne Marcellus Co., amasite, without, $6,507.66; Headley process, without, $6,414.22; M. E. Mulhall, with one year guarantee, $7,822; without, $7,280.90; Henry R. Edwards, amasite, with two year guarantee, 4-in. thick, $7,040; 3-in. thick, $5,866.67; Eastern Pethrolythic Co., with five year guarantee, $8,997; without, $7,797.

Section 3, Madison ave., Morris Township—George F. Bracket, tarvia, without, $7,001.86; Eastern Pethrolythic Co., with five year guarantee, $10,493; without, $9,093; Henry R. Edwards, amasite, with two year guarantee, 4-in. thick, $8,184; 3-in. thick, $6,820; M. E. Mulhall, with one year guarantee, $9,093; without, $8,638.55; Sands & Co., with three year guarantee, $9,093; without, $7,456.26.

Section 4, Main st., Madison—Sands & Co., with three year guarantee, $13,128.68; without, $10,936.76; M. E. Mulhall, with one year guarantee, $14,711; without, $13,975.45; Osborne Marcellus Co., Headley process, without, $11,352.44; amasite, without, $11,629.33; George F. Brackett, tarvia, without, $10,660.39; Henry R. Edwards, amasite, with two year guarantee, 4-in. thick, $12,460; 3-in. thick, $10,383.34.

Section 5, Main st., Chatham—Osborne Marcellus Co., amasite, without, $8,213.33; Headley process, without, $8,017.77; George F. Brackett, tarvia, without, $7,528.88; Sands & Co., wtih three year guarantee, $9,972.56; without, $9,213.52; M. E. Mulhall, with one year guarantee, $9,777; without, $9,288.15; Henry R. Edwards, amasite, with two year guarantee, 4-in. thick, $8,560.77; 3-in. thick, $7,040.

Section 6, Mine Hill—H. K. Salmon, with one year guarantee, $4,500; without, $4,000; amasite, with one year guarantee, $5,000; Osborne Marcellus Co., amasite, without, $4,200; Headley process, without, $3,850; J. B. Gougherty, Headley process, without, $5,000.

Section 7. Allen st., Netcong—J. B. Gougherty, Headley process, without, $4,229.74; H. K. Salmon, with one year guarantee, $3,187.72; without, 2,738.14.

Newark, N. J.—Bids for oil for sprinkling about sixty miles of county roads were opened and tabulated on which six firms put in figures, the lowest being the Pennsylvania & Delaware Oil Co., at 2½c. a sq. yd., and Sands & Co. at 2 3-4c. a sq. yd.; these two were given the contracts.

Plainfield, N. J.—Three bids were received by Council May 24 for macadamizing six streets, and the one of Mobus & Burke, city, being the lowest and most advantageous, was accepted. The bids were offered on the basis of so much per sq. yd. as follows:

Mobus & Burke—Union st., $1.40, $1.55, $1.68; Steele ave., $1.71; Madison ave., $1.48; Darrow ave., $1.54; Compton ave., $1.50; Ravine road, $1.70.

Warren B. Travell—Union st., $2.09; Steele ave., $2.38; Madison ave., $1.99; Darrow ave., $2.27; Compton ave., $2.29; Ravine road, $2.34.

Weldon Contracting Co., all or none—Union st., $1.88; Steele ave., $2.03; Madison ave., $1.72; Darrow ave., $1.95; Compton ave., $1.93; Ravine road, $1.97.

Roosevelt, N. J.—Matthew A. Hermann, the low bidder, was awarded the contract for the supply of 1,500 tons of stone to be used in macadamizing Rahway ave.; his price per cu. yd. was $1.96, equivalent to $1.45 per ton of stone; this includes the cost of delivery on the road where required; the Clinton Point Stone Co., of New York, quoted 87c. per cu. yd. delivered on the Carteret dock, but Council came to the conclusion that all things considered Mr. Hermann's figures were lower than those of his competitors.

Albany, N. Y.—Bids were received as follows by the Board of Contract and Supply, Albany, May 17, for the improvement of Main ave., from Madison ave. to Park ave.: Holler & Shepard, Albany, $37,128; Edward F. Dillon, Albany, $25,985; John M. Holler, Albany, $25,291; Michael F. Dollard, Albany, $22,707; Mulderry Bros., Albany, $24,091; the contract was awarded to Michael F. Dollard, Albany, at $22,707.

Bids were received on the same date by the Board as follows for the grading of Mercer st., from Lake ave. to Quail st.: James H. Malcolm, Albany, $3,270; Michael F. Dollard, Albany, $2,987; James F. Campion, Albany, $2,800; Holler & Shepard, Albany, $3,285; the contract was awarded to James F. Campion, Albany, at $2,890.—Walter Melius, City Engineer.

Harrison, N. Y.—Contracts for macadam pavement, with asphalt binder, have been awarded as follows: To John Merritt Contracting Co., Portchester, for 8,450 sq. yds. on Polly Park road, $1.60 per lin. ft., total $13,932; to Harvey B. Sproul, Peekskill, for 3,000 sq. yds. on West and Hancock sts., at $2.50, total $8,820, and to John Twiname, White Plains, for 9,450 sq. yds. on Union and Locust aves. and North st., about 9,450 sq. yds. $1.76 and $1.85 per sq. yd., total $17,479.—F. P. Coxe, Town Clerk.

Newburgh, N. Y.—Mayor McClung has signed the contract awarding the paving of North Water st. to Gross & Spino.

North Tonawanda, N. Y.—The North Tonawanda Board of Public Works has awarded the contract for the paving of Vandevoort st. with Bessemer shale brick to the Louis H. Gipp Construction Company, of Buffalo, on its bid of $24,516.50.

Barberton, O.—Paul & Henry, of Barberton, have secured the contract for paving Wooster and Baird aves. at $34,144 and $2,139, respectively.

Bucyrus, O.—Vernon Township Trustees received bids on five miles of new road and three miles of top dressing and later rejected them; bidders were as follows: L. R. McMichael, Bucyrus; Mack Gledhill, Galion; G. M. Wilcox & Son, Kenton; Uncapher, Scott & Co., Marion; A. J. Stough, Galion; W. H. Raymond & Co., Galion; D. Kissling, Tod Township, and W. H. Dickson, Bloomville; the low bidders were McMichael, Gledhill and Stough.

Chatfield Township Trustees received six bids on road work; the bidders were: L. R. McMichael, W. H. Raymond & Co., D. Kissling, Lima Stone Co., Taylor & Biggs, of Findlay, and G. V. Harer, of Lykens.

Circleville, O.—S. Monroe & Son, city, have been awarded a contract for laying 8,740 sq. yds. brick pavement, on concrete foundation, 6-in. thick, for $1.36 per sq. yd.; also furnishing and setting 4,590 lin. ft. Berea stone curb, at 41c. per lin. ft. E. Huff & Son, city, have been awarded a contract for constructing 2,530 sq. yds. cement sidewalks, 4-in. thick, on gravel foundation, 5-in. thick, for 63c. per sq. yd.—J. H. Sweetman.

Cleveland, O.—Rinehart Bros., East Liverpool, O., were awarded a contract for paving in the city of Cleveland which involves in the neighborhood of $80,000.

Cleveland, O.—Adams Bros., of Zanesville, have secured the contract for paving the Warner road for about $53,000; bids were opened May 12 by Board of County Commissioners.

Columbus, O.—Public Service Board Directors have awarded the contract for the paving of Poplar ave. to H. J. Shaw on his bid of $9,912; Nelsonville brick with an asphalt filler will be used.

The Board of Service has awarded contracts for the improvement of three streets as follows: Sandusky, from Broad to Broderick, to Geigels, Garnes & Co., Athens, brick, price $2,614; Wall st., from Stewart to Humboldt, to the same firm, Nelsonville brick, $1,917; Spring st., from Tallmage to 20th sts., to H. J. Shaw, Nelsonville brick, price $8,670; W. E. Schwartz was the lowest bidder on this street, but his bid called for Athens brick and the property owners presented a petition asking that the Nelsonville brick be used.

The first step toward the consummation of the good roads plans of Franklin County was made when the contract for the construction of the National road east and west was let. The work will cost in the neighborhood of $100,000, of which the County Commissioners will pay about $76,000; the contract for the National road from the Big Four crossing west to the county line was let to C. Wooley & Co. for $49,000; William E. Schwartz was awarded the contract for the road from the T. & O. C. railroad to Bexley, and the Licking County line, for $50,000; the roads will be constructed of macadam with various oil surfaces.

East Liverpool, O.—J. C. Cunningham was the lowest of nine bidders for constructing sewers, and as his bid was unconditional and in every way came up to the requirements of the advertisement, it is very probable that the contract will be awarded to him, at $10,600.89; the bid of Hinton, Schmelzenbach & Lutton was the second lowest, at $12,180.19; the other bidders were Rinehart Bros., the Sand & Gravel Co., John N. George and E. J. Ryan, of this city, and George B. Patterson and John T. Nagle, Wellsville; the contract includes the laying of 6,635 ft. of 6-in. pipe and 4,483 ft. of 4-in. pipe on eight streets.

Norwalk, O.—Nine bids were opened May 15 by the Board of Public Service for the paving of East Seminary st., from Benedict ave. to Woodlawn ave., its entire length; the best bids were for Wooster block brick, which has been used in this city for a number of years, with tar filler, although bids were received on other material; the bids on the Wooster block and tar filler were as follows: G. B. Herring & Sons, Mansfield, $6,148.16; W. E. McHugh, Springfield, $6,391.10; James Quinn, Norwalk, $6,865.82; Kinney & Zeigler, Fremont, $7,207.05; A. J. Stough, Galion, $6,830.97; C. W. Anderson, Norwalk, $6,714.53; R. W. Brown, Norwalk, $7,649.90; Ohio Paving Co., Toledo, $7,496.10; Lee & Griggs, Clyde, $6,867.25; in case it is decided to use cement filler instead of tar the sum of $236.50 can be deducted from each bid, and should Malone curbing be used $65 should be added to the price bid on Cleveland Stone Co. curbing; the lowest bid is that of George Herring & Sons.

The County Commissioners, May 18, opened bids for a mile and three-quarters of State aid road to be built from the B. & O. tracks in Havana, northeast through the townships of Norwick, Sherman and Peru; the contract was awarded to Taylor & Biggs, of Findlay, for $9,000; other bids were received as follows: Wilson & Yardley, Newark, Wagner stone, $9,800.29; Theodore W. Hill, Bellefontaine, Wagner stone, $9,950; Charles F. Grinnell, Norwalk, $10,150; The Lyme Construction Co., Bellevue, $9,850; F. L. Rice, Shelby, Wagner stone, $10,000; Buckeye Construction Co., Norwalk, Bellevue and Bloomville stone, $10,050; Buckeye Construction Co., Sandusky stone, $9,490.

Toledo, O.—Contract for the paving of Summit ave., between Michigan ave. and Bay View Park, has been let to Garrigan Bros. by the Servers. The job is to be completed by July 1. Garrigan Bros. bid $18,690.10 for the paving outside the street car tracks and $4,549.60 for the part inside the rails. The Big Con will pay the $4,549.60.

Wooster, O.—The Board of Public Service, May 10, opened bids as follows for brick paving on West North st.—(a) concrete, and (b) stone foundation (price given per sq yd.): Greist & Howard, of Wooster, (a) $1.50, (b) $1.40; W. H. Duell, of Creston, (a) $1.68, (b) $1.48; Wm. L. Long, of Wooster, (a) $1.69, (b) $1.37½; Geo. B. Herring & Son, of Cleveland, (a) $1.47, (b) $1.36; Shannon & Wilderson, of Orrville, (a) $1.70, (b) $1.49; Lee & Griggs, of Clyde, (a) $1.53, (b) $1.35; G. A. Lagron, of Elyria, (a) $1.40½, (b) $1.22½, and Michael Landers, of Wooster, (a) $1.60 and (b) $1.35.

Youngstown, O.—The Directors of Public Service have let the contract for paving West Commerce st. to John Grady at $8,801.50.

Eugene, Ore.—Council has awarded the contract for paving with bitulithic a portion of Oak st. to the Warren Construction Co., at $210 per sq. yd., and cement curbing to T. N. Ellis.

Allentown, Pa.—George H. Hardner, Allentown, Pa., has been awarded contract, at $32,450, for rebuilding the Bethlehem pike, the work including 1,000 ft. of concrete box gutters and 16,000 ft. of stone gutters.

Coraopolis, Pa.—For street paving the bid of Baldwin & Baldwin was considered the lowest and the contract was awarded that firm.

Erie, Pa.—Mayor Liebel has approved the contract awarded by Councils for the paving of the Buffalo road, east to the city line, with Bessemer blocks.

Harrisburg, Pa.—Action on the recommendation of the Highway Commissioner that the contract for the paving and curbing of 16th st., from Forster to Herr, be awarded to the Barber Asphalt Co. has been postponed by Select Council on motion of Mr. Snavely, who said that it was best to find out whether there was available money for the paving.

The Barber Asphalt Co. underbid the Warner-Quinlan and the Central Construction & Supply Co. on the paving of 16th st. from Forster to Herr sts.; the Barber Co. has recently been underbid by the Central Construction, which is now 13c. a yard higher in its bid than the Barber; the bids were as follows: Barber, $1.73 for Trinidad sheet asphalt; Warner-Quinlan, $1.89, Bermudez; Central Construction, $1.86, Maltha; for granolithic curbing per foot the companies bid respectively 50c., 59c. and 45c.

Pittsburg, Pa.—The following contracts for repaving were awarded by the city: With block stone—Smallman st., 21st st. to 24th st., $7,422.80; Smallman st., 26th to 28th st, $5,589.65; South 19th st, $1,592.15; 40th st., $6,445.55; Fisk st., $8,644.10; Basim st., north side, $1,619.25; Bedford ave., $2,879.75; with asphalt—Western ave., north side, $2,003; Ridge st., $5,113.10; Federal st., north side, from present Asphalt ave. to Church ave., $3,489.50; Federal st., north side, Park ave. to North Diamond st., $10,894; Hatfield st., $4,708.60.

York, Pa.—There was one bid for the guttering of School alley, between West st. and Belvidere ave., the General Supply & Construction Co., at $498.50, and the contract was awarded to the company.

Ft. Mansfield, R. I.—The following bids were opened, May 10, by Capt. Chas. T. Baker, for resurfacing 5,915 ft. of road, for macadamizing 525 sq. yds. areaways and concreting 2,455 ft. of road: Ricardo R. Morgan, $17,202; Bryan F. Mahan, $15,642; Long Island Construction Supply Co., $18,618; Frank Arrigoni & Bro., $14,581; Connecticut Hassam Paving Co., $15.474; Michael P. Shea and Frank H. Reade, $16,665; B. A. Beard Co., $14,575; F. A. Eldredge, $10,686; W. H. Fissell & Co., $25,000.

Aberdeen, S. D.—The Public Service Committee has decided to put in a 3-ft. gutter along the lines of improvement on Main st., thus cutting down the contract from 46,000 sq. yds. to 41,800. John O. Jones, representing the Western Improvement Co., of Racine, Wis., was awarded this contract at $2.63 per sq. yd., for creosote blocks. This will make the full face of the contract approximately $110,000 for the paving. The work calls for a mile and a half of paving or 46,500 sq. yds., to cost $100,000. The bids are as follows, where the city retains the dirt excavated, price being for square yards:

Creosote wood blocks—Flinn & Hanlon, of Sioux City, $2.76; J. O. Jones, of Racine, $2.63; James Kennedy, of Fargo, $2.85; General Contracting Co., of Minneapolis, $2.84; Fielding & Shepley, of St. Paul, $2.85; E. G. Webster, $3.03.

Brick—Flinn & Hanlon, $2.80; Jones, $2.61; Kennedy, $3; Webster, $2.85.

Macadam—Flinn & Hanlon, with tar filler, $2; Jones, without tar $1.39, with tar same; Kennedy, $2.40; with tar, $2.60; General Contracting Co., $1.45; with tar, $1.64; Fielding & Shepley, $2.05; with tar, $2.30; Webster, $1.38; with tar, $1.53.

In case the city would give the dirt to the contractor the bids will be as follows:

Wood—Flinn & Hanlon, $2.72; Jones, $2.62; Kennedy, $2.84; General Contracting Co., $2.78; Forrestal & Feyen, of St. Paul, $2.96.

Brick—Flinn & Hanlon, $2.80; Jones, $2.60; Kennedy, $2.99; Forrestal & Feyen, $2.79, $2.64.

Macadam—Flinn & Hanlon, with tar, $2; Jones, $1.38, with tar $1.38; Kennedy, $2.40; with tar $2.60; General Contracting Co., $1.40, with tar $1.59; Forrestal & Feyen, $1.54, with tar, $1.81.

Asphalt—Jones, $2.76.

Contracts for four blocks of cement sidewalk along 3d ave. west were also awarded, two blocks to A. E. Benson for $240 and two blocks to Nelson Bros. for $340.

Knoxville, Tenn.—The Knox County Road Commission has purchased a new road roller from the Kelly-Springfield Company, the purchase price being $3,000; the company agrees to take the old roller that has been in use for the past seventeen years at $1,000, as part payment for the new machine; the new roller will weigh thirteen tons and have all modern equipment.

Geddes, S. D.—Thogmartin & Gardiner, who recently organized as a firm for general contracting business, have been awarded the contract for the construction of the good roads east from the city, from their present termination to the Missouri line, a distance of 1 7-100 miles; contract was awarded by the Good Roads Commissioners over two other bidders, the Midland Construction Co. and J. A. White.

Total of the bid filed by the successful bidders was $1,463.46, which was several hundred dollars less than the bid filed by White and some three hundred less than that of the Midland Construction Co.

Fort Worth, Tex.—The General Supply & Construction Co., of which John B. Hawley, formerly City Engineer, is President, has been awarded contract for paving Penn st. with bituminous macadam, at $2.07 per sq. yd.; Frank Lanham, Local Manager of the Texas Bitulithic Co., threatens an injunction suit, claiming that the proposed pavement is an infringement on the patents of the Warren Brothers.

At the same letting, bids by the Bitulithic Co. for paving nine streets with its waterial, were accepted by the City Commissioners at a price of $2.08¾ per sq. yd.

Ft. Monroe, Va.—The lowest bid opened, May 17, by Capt. Ernest K. Tilton, Constr. Q. M., U. S. A., for filling, grading, surfacing and constructing concrete walks, brick gutters and macadam roads around Artillery School buildings, is reported as follows: Alsop & Peirce, of Newport News, Va., macadam roads, 98c. per sq. yd.; catch basins, $18 each; gutters, brick, 21c. per lin. ft.; tile drain, 30c. per lin. ft.; area between buildings, 17c. per lin. ft.; concrete curb, 58c. per lin. ft.; sidewalks, new, 15½c. per sq. ft., and old, $18c. per sq. ft.; fill, ordinary, 64c. per cu yd., and top soil, $1.58 per cu. yd.

Richmond, Va.—The Christian Construction Co., Durham, N. C., has contract to pave Broad st.

Bellingham, Wash.—Contract for Magnolia and Dock sts. asphalt pavement and concrete sidewalks was awarded, May 3, to the Independent Asphalt Paving Co., at $37,873, and for Kentucky st. grading and concrete sidewalks to W. Brooks, at $5,346.

Olympia, Wash.—The State Board of Control, May 21, opened bids and awarded contracts for the four complete rock crushing plants to be installed, there were ten bids received; the Austin Manufacturing Co., of Chicago, will furnish the four crushers complete for $13,899, and the Allis-Chalmers Co. will furnish the engines and boilers and the electrical plant, pumps, etc., for about $36,000; the exact location of the plants has not been determined, the bidders quoting delivery prices respectively at Seattle, Spokane, Vancouver and North Yakima.

Walla Walla, Wash.—John Fries has been awarded the contract for macadamizing the streets in several improvement districts and has started operations.

Bramwell, W. Va.—City has awarded contract to Wingate & McGhee for paving and curbing two principal streets at $2.60 per yd. for paving and 74c. per ft. for concrete curbing; roadway to be 25 ft. wide.

Wheeling, W. Va.—Assistant State Highway Commissioner D. W. Seitz opened proposals on the Wintersville State aid road and there was only one bid. It was rejected because it was higher than the engineer's estimate.

Green Bay, Wis.—P. H. Shea has been awarded the contract for the improvement of the streets of Oak Circle, the Van Dycke Co.'s addition to the city.

Menasha, Wis.—Kasel Conctruction Co. has secured contract, at 30c. per sq. yd., for constructing cement paving on Milwaukee and Ahnaught st., and at 15c. per ft. for curbing; city is to furnish material.

Milwaukee, Wis.—Contracts for the grading, macadamizing, curbing and sidewalks of 22d ave. were awarded May 13 by the Board of Public Works: R. H. Gumz, grading, for 30c. a yd. and macadamizing for 65c. a yd; Northwestern Construction Co., for the curbs and gutters, at 37½c. a ft. and the cement walks for 11½c.

Lethbridge, Alta, Can.—Batchellor, Marshall & Skarin, Calgary, have been awarded contract for laying cement walks here for the city; cost, $40,000.

Winnipeg, Man., Can.—J. W. Astley, Engineer of Construction, has been awarded contract for 28,455 sq. yds. asphalt on 6-in. concrete base at $2.75, and 5,451 ft. asphalt on 4½-in. concrete base at $2,675; also for setting 17,591 lin. ft. artificial stone curb at 86 2-3c.—M. Peterson, Secretary Board of Control.

SEWERAGE

Dothan, Ala.—City has selected J. B. McCrary & Co., Empire Bldg., Atlanta, Ga., to design and supervise construction of sewer system; $20,000 is available.—H. W. Lisenby, Clerk.

Ensley, Ala.—Citizens have voted $175,000 bonds for sewer, jail and school improvements and for the increasing of the Fire Department.

Little Rock, Ark.—City will construct sewers in the Water Cross Improvement District; Pulaski County has contributed $20,000.

Van Buren, Ark.—City will install a pumping station at mouth of sewer, in case of flood sewage will be forced into Arkansas River after being pumped out of sewers.

Corona, Cal.—City has voted $135,000 bonds for the construction of a sewer system.—H. C. Kellogg, Santa Ana, Consulting Engineer.

East San Jose, Cal.—The Board of Town Trustees has voted to start work as soon as possible on proposed sewerage system, plans include the laying of 21,000 ft. of sewer pipe on various streets at a cost of $29,604.

Imperial, Cal.—Engineers Olmsted & Gillelen, Wright & Callender Bldg., Los Angeles, have submitted plans for the construction of a sewer system; $50,000 bonds will be issued.

Oakland, Cal.—Council has authorized $40,000 for the construction of storm sewers; sum is to be used in work all about the city, necessitated by the growing population in many districts.

San Francisco, Cal.—Contracts will be let in the next 45 days for five miles of additional sewers.

San Leandro, Cal.—Provision has been made by the Board of Town Trustees for the bond election to be held June 28, at which the citizens are to be asked to vote $20,000 for the construction of a sewer through the territory recently annexed to the town; outlet sewer is to drain a territory half a mile wide and more than two miles long.

Waterbury, Conn.—The Board of Aldermen has ordered sewers constructed on Brewster st., from the present terminus to Platt st., estimated expenditure $300; on Elmwood ave., from Plaza to Wildwood aves., estimated expenditure $5,000; on Merry st., from Washington st. 200 ft. northerly.

Washington, D. C.—Henry B. F. Macfarland, Henry L. West and William V. Judson, Commissioners, have approved recommendations of Engineer Department for following improvements: Sewer in T st. and Wisconsin ave.; Luzon ave. trunk sewer from Military road to grounds of Walter Reed Army General Hospital, at cost of $11,800; catchbasin at 5th and S sts. N. W. and at 5th and S sts. N. E.

Madison, Fla.—Citizens will vote on $15,000 bonds for sewerage system.

Tampa, Fla.—Citizens have defeated proposition to issue $480,000 bonds for sewerage, additional street paving and other improvements.

Savannah, Ga.—Citizens are considering voting on $300,000 bonds for extension of house drainage system.—John W. Howard, City Engineer.

Belleville, Ill.—The Board of Local Improvements will take up matter of sewering and paving wherever necessary of the following thoroughfares: 3d, Eastman, Monroe, Oak, Walnut, D and the southern ends of Illinois, Jackson and Church sts., Douglass, Wabash, Portland and Pennsylvania aves.—G. H. Beineke, City Clerk.

Canton, Ill.—City is considering installation of a new sewer system.

Joliet, Ill.—Council has adopted a resolution for constructing a sewer system in Akin and Hobbs aves. and Henry st.; cost about $5,071.80.

Lincoln, Ill.—Council has appropriated $2,000 for sewer improvements.

Elkhart, Ind.—The Board of Public Works will prepare resolutions of necessity for sewers in Garfield, East Beardsley, Edwardsburg and Willowdale aves.; also 4th, Michigan, Mishawaka, Eden and Prairie sts.

Hammond, Ind.—City has accepted plans and specifications for the Towle st. sewer.

Indianapolis, Ind.—An investigation relative to establishing an experimental sewage disposal plant has been started by City Engineer Blaine H. Miller and Charles A. Brown, Assistant Engineer in Charge of Sewers; the Engineers also considered the questions involved in extending the White River interceptor from its present mouth near Pogues Run and White River, to a point south of the city limits, where the permanent plant will ultimately be established; city will erect a temporary station near Pogues Run and White River, utilizing part of the sewage from the White River interceptor for the tests; White River

interceptor carries approximately 15,000,000 gallons of sewage a day, but it is the intention to utilize only about 100,000 gallons a day; experimental station will cost approximately $30,000; a tract of about one-fourth acre will be leased for a year and a concrete septic tank built; into this sewage will be pumped from the interceptor and sprayed on a filter of crushed stone, from which it will run into a settling basin.

Indianapolis, Ind.—The Board of Public Works has adopted plans for sewers as follows: Washington boulevard between 38th and 42d sts., in first alley north of Roach st., and in the alleys east and west to Pierson ave.

Laporte, Ind.—Council has taken steps toward giving the city a new sewer system; present system lacks an adequate outlet and does not meet the requirements of the city; Council has entered into contract with Prof. R. L. Sackett, sanitary expert at Purdue University, to prepare plans and specifications for a new sewer system to cost $200,000.

Nevada, Ia.—Citizens have voted to expend $10,000 for constructing sewer system and disposal plant.

Augusta, Kan.—Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., are preparing plans for sewers.

Wichita, Kan.—Plans are being prepared by City Engineer B. C. Wells for a 15-in. vitrified pipe sewer in District No. 15; also two vitrified brick, concrete or tile sewers; cost $70,000.

Oakland, Md.—The Second National Bank, Cumberland, has been awarded the $45,000 sewer and water works bond issue at $1.06.

Northampton, Mass.—The Sewer Commissioners have requested Council to co-operate with them in requesting the Board of Health to compel all those who have not yet entered the sewer to do so at once.

Taunton, Mass.—The Governor has signed the bill permitting the Taunton Insane Asylum to connect its sewerage system with the city's system.

Traverse City, Mich.—Preliminary survey has been made by Geo. S. Pierson, Kalamazoo, for a sewage disposal plant; estimated cost, $20,000.

Albert Lea, Minn.—The time for receiving bids for the construction of pipe and brick or concrete sewer, originally set for June 10, has been postponed; bids will be called for shortly.—Wm. Barneck, City Engineer.

Duluth, Minn.—City Council is considering plans for a trunk sewer in Oneota district.

Neosho, Mo.—Plans have been completed for a sewer system; cost, about $40,000.—John M. Sherwood, Engineer.

Chatham, N. J.—Citizens will soon vote bonds for constructing a sewer system; cost $70,000; two trunk sewers, operated by gravity or electrical pumping station, will be constructed; also settling tanks and sand beds.—Williams, Proctor & Potts, 17 Battery pl., New York City, Consulting Engineers.

Trenton, N. J.—The Sanitary Committee has recommended that sewers be built on Beatty and Jersey sts. and Ashmore ave.

Portales, N. M.—Citizens have voted $75,000 bonds for sewers, water and light systems.

Brooklyn, N. Y.—The Board of Estimate has authorized receiving the installation of a number of receiving basins; cost $5,080; also the construction of sewers in Rogers ave. and Sullivan st., cost $16,800; 47th st., $14,500; East 40th st., $21,200; 50th st., $3,800, and Whitehall pl., $2,200.

New York, N. Y.—The Hudson River is to receive more raw sewage a few miles north of the mouth of the Bronx Valley sewer; newly formed Putnam Association, whose purpose is the development of the region traversed by the Putnam division of the Central Railroad, is contemplating the construction of a trunk sewer to drain the Sawmill River Valley from Briarcliff Manor to the city line of Yonkers; the Hudson would receive the sewage of this region through an outlet near Hastings or Dobbs Ferry; advocates of the Putnam sewer plan are considering the creation of a legislative commission, similar to the Bronx Valley Sewerage Commission, to carry out the project.

Niagara Falls, N. Y.—The City Engineer has estimated cost of constructing sewer in Augustus pl. at $886.20 and in Townsend pl. at $717.09.

Rochester, N. Y.—The Streets and Sewers Committee is considering request of Henry S. Crabbe for permission to connect buildings outside the city at Nursery st. and the city line with a city sewer.

Columbus, O.—The Board of Service has decided to make some investigations of the sewage disposal plants in other cities and with that end in view authorized C. B. Hoover, chemist in the sewage disposal plant, to make a trip that will carry him to a half dozen cities.

Findlay, O.—City Engineer U. K. Stringfellow is preparing plans for a sewerage system for the east side; also in Carnohan ave. and Marshall st.

Lorain, O.—A new idea is being worked out for the taking care of the sewerage water on Pearl st. and adjoining streets. Present plan is to connect the district between Fulton st. and Pearl st. with another sewer, which will run through the steel plant land in the vicinity of the open hearth furnaces, thus taking much of a tax off from the other sewer; district between Grove st. and Pearl will then be taken care of by the old sewer.

Youngstown, O.—Bids will be received June 21, 2 P. M., for $600 Bellview ave. and $1,650 East Federal st. sewer bonds.—W. I. Davies, City Auditor.

Capitol Hill, Okla.—The Board of Trustees has accepted plans and specifications for sewer system; cost $15,000; bids will soon be received.

Tulsa, Okla.—The County Commissioners have created a drainage district in the vicinity of Beggs, along the Arkansas River in the south end of Tulsa County, and will reclaim 20,000 acres of land now worthless because of overflows; improvement will be paid for by a special issue of County bonds and will cost about $50,000.

Clifton Heights, Pa.—Citizens are discussing the installation of a first-class sewerage system.

Hazleton, Pa.—Council is considering ordinance providing for a system of sewers on Vine st.

New Castle, Pa.—An agitation to reconsider the idea of a $100,000 bond issue for sewering and paving, voted down a year ago, has been started.

New Castle, Pa.—City has until November 1 to select a site and adopt plans for a $250,000 sewage disposal plant demanded by the State Health Department; Shaw's island in the Beaver River, between here and West Pittsburg, probably will be selected for the plant.

Parsons, Pa.—Council is seeking the co-operation of the city of Wilkes-Barre in the sewering of the borough; plan is to simplify matters by connecting to the 42-in. sewer at the extreme northern end of the city.—W. S. Casterlene, Attorney.

Scranton, Pa.—One of the most gigantic sewering jobs undertaken by the city in recent years is under consideration by City Engineer W. A. Schunk and Director of Public Works C. V. Terwilliger, as a result of which it is expected that nearly 7½ miles of new sewer will be laid in West Scranton and the Providence section; project for most of this sewering is being fathered by Common Councilman A. B. Briggs, of the Second Ward, who will introduce an ordinance calling for a bond issue of nearly $40,000 to bear the city's share of the expense, as soon as the plans and specifications for the proposed sewers are completed by the City Engineer.

Wilkes-Barre, Pa.—Council is considering construction of proposed valley sewer, cost $70,000.

York, Pa.—The Highway Committee has decided to advertise for bids for constructing a sewer on East Princess st. from Queen to Duke sts.

York, Pa.—The Highway Committee of City Council has advertised for the building of an extension to the Jackson st. sewer and the construction of a storm water sewer on Market street from Columbia ave. to Broad st. and on Broad st. to the Poor House Run.

Newport, R. I.—Council has passed resolution providing for the construction of sewers on Hodge, Lowell, 11th and 10th sts.

Charleston, S. C.—Freeholders have asked Council to order a special election for the purpose of issuing bonds for the establishment, maintenance and increase of the city's sewerage.

Aberdeen, S. D.—Council has authorized the Public Service Committee to secure a site and erect a building on the north side to house a pump and motor for the storm sewer system; expenditure contemplated is several thousand dollars.

Chattanooga, Tenn.—Citizens will vote on $100,000 bonds for the crosstown sewer and $25,000 for small sewers.

Elizabethton, Tenn.—City will receive bids about July 1 for sewer construction; cost $33,500.

Belton, Tex.—Physicians are circulating a petition in favor of a sewerage system.

Canyon, Tex.—Citizens will ask Council to submit to a vote the proposition to issue $33,000 bonds to install a sewer and water works system; election will be held at an early date.

Cuero, Tex.—Council has appointed committee, F. W. Bates, Chairman, to prepare map showing levels and to ascertain cost of sewer system.

Leon Springs, Tex.—Bids will be received June 1 by John L. Clem, Ch. Q. M., U. S. A., San Antonio, for sinking a tubular well to a depth of 2,000 ft. if required, near here.

Lockhart, Tex.—City will extend sewer system in residence section.—E. B. Coopwood, A. A. Storey and George Baker will have charge.

Texarkana, Tex.—Mayor DeLoach and Mayor Trigg, of Texarkana, Ark., together with a committee from each City Council, have reached an agreement to build a septic tank, jointly, for the destruction of the sewer wastes of the two cities; proposed tank will cost about $5,000 and will be located on the Texas side at a point a considerable distance south of town.

Norfolk, Va.—The Local Board of the Seventh Ward will ask Council for a $60,000 additional bond issue, money to be expended perfecting sewer system and improving streets.

Portsmouth, Va.—The Sewerage Committee will soon advertise for bids for the purchase of boilers and other machinery for the operation of the new sewerage system now being installed in Park View.

Spokane, Wash.—Plans are completed for sewering Cliff ave., Lincoln to Sumner aves.; estimated cost, $2,538.

Beloit, Wis.—The Board of Public Works will lay a 24-in. storm water sewer across 4th st.

Janesville, Wis.—Council will consider proposed sewer extensions in Districts 10, 11 and 14.

Madison, Wis.—The Water Board is favorable to the laying of an intake pipe into Lake Mendota and has adopted a resolution directing the Superintendent to procure plans for the improvement.

Monroe, Wis.—The local sewage disposal problem will be placed in the hands of a permanent commission to manage and keep in touch with it; city has partly completed a septic tank and filter bed system, but because of heavy sewage from Borden's milk plant, which floods the plant with thousands of gallons of sewage daily, the plant must be enlarged.

Bridgeburg, Ont., Can.—Citizens are considering the construction of a trunk sewer and sewage disposal plant; cost, about $25,000.

Calgary, Alta., Can.—City Engineer Childs has recommended sewer improvements; cost $10,000.

Havana, Cuba.—R. Winthrop Pratt, Engineer of the State Board of Health, Columbus, O., has been engaged by the Cuban Government to install a new sanitary system in that country.

BIDS RECEIVED AND CONTRACTS AWARDED

Washington, D. C.—Bids for the construction of two new sewers were opened at the District building by E. E. Helm, Acting Chief Clerk of the Engineer Department, as follows:

For the construction of extension of Rock Creek sewer to Military road—E. G. Gummel, 50c. per lin. ft. for ordinary excavation, $14 per cu. yd. for sewer brick masonry and 85c. per ft. for 18-in. sewer pipe laid; James A. Coyle, 70c. per lin. ft. for ordinary excavation, $14 per cu.yd. for sewer brick masonry and 90c. per ft. for 18-in. sewer pipe laid; W. F. Brenizer Co., 70c. per lin. ft. for ordinary excavation, $15 per cu. yd. sewer brick masonry and 79c. per ft. for 18-in. sewer pipe laid; Stutler & Ready, 71c. per lin. ft. for ordinary excavation, $14 per cu. yd. for sewer brick masonry and 79c. per ft. for 18-in. sewer pipe laid; R. J. Beall Construction Co., 65c. per ft. for ordinary excavation, $13.50 per cu. yd. for sewer brick masonry and 89c. for 18-in. sewer pipe laid; Lyons Bros., 65c. per ft. for excavation, $17 per cu. yd. for sewer brick masonry and $1.10 per ft. for 18-in. sewer pipe laid.

For construction of section E, intercepting sewer, Boundary to Brookland—W. F. Brenizer Co., $9.90 per lin. ft for ordinary excavation, $20 per cu. yd. for sewer brick masonry, $25 per cu. yd. for inverted brick masonry and $11 per cu. yd. for concrete masonry in place; E. G. Gummel, $9.50 per ft. for ordinary excavation, $20 per cu. yd. for sewer brick masonry, $30 per cu. yd. for inverted brick masonry, and $12 per cu. yd. for concrete masonry in place.

Richmond, Ind.—Philip Hipskind, Wabash, was the low bidder, May 26, for constructing sewers as follows: 330 ft. 42-in. concrete sewer; 460 ft. 36-in. concrete sewer; 450 ft. 48-in. concrete sewer; 212 ft. 24-in. concrete sewer; 1,600 ft. 54-in. concrete sewer, all 3-in. shell, 1:5 concrete, depth 10 ft., with ground water to be cared for; also 1,600 ft. 15-in., 1,100 ft. 20-in.; 700 ft. 12-in. sewer pipe; 24 manholes; 20 direct inlets. The average price per lin. ft., all bids, was: Philip Hipskind, Wabash, $3.38; Lewis Hall, Delphia, Ind., $3.49; W. H. Boyd, Dayton, O., $4.09; J. F. Cronin, Richmond, $3.95; Michaels & Minnich, city, $4.15; W. H. Harris, city, $4.70; wages of common laborers, $1.75.—Fred R. Charles, City Engineer.

Sioux City, Ia.—Lewis & Leeder secured the contract for sanitary sewers on Geneva, Panoah and 8th sts. at $745.75. Bids on

Clear Lake, Iowa.—Bids on sanitary sewer.—Burns & McDonnell, Civil, Hydraulic and Sanitary Engineers, Kansas City, Mo.

BIDDERS Specifications	Quantities	Advance Con. Co., Waukesha, Wis.	M. A. Camery, Harlan, Ia.	J. W. Turner Impr'v Co., Des Moines, Ia.	Axelsen Bros., Clear Lake, Ia.	O'Farrel Con. Co., Dubuque, Ia.	Dearborn & Jackson, Cedar Rapids, Ia.	M. Tschirge & Sons,* Dubuque, Ia.	Geo. M. King, Des Moines, Ia.
Lin. ft. 8" vit. sewer pipe	12,018	$0.23	$0.20	$0.17	$0.18	$0.15	$0.15	$0.16	$0.14
" " 10" " " "	9,978	.28	.25	.21	.22	.18	.19	.23	.17
" " 12" " " "	3,785	.34	.35	.26	.25	.22	.22	.28	.24½
" " excavation under 6'	5,017	.19	.15	.16	.25	.20	.10	.05	.15
" " " 6' to 8'	4,975	.45	.35	.31	.70	.43	.35	.20	.32
" " " 8' to 12'	8,126	.21	.20	.26	.50	.23	.15	.10	.20½
" " " 12' to 16'	5,315	.61	.40	.39	.90	.73	.45	.30	.50½
" " " 16' to 20'	2,348	1.05	.75	.76	1.10	.83	.85	.40	.71
6" on 8" "Y" connections	527	.26	.35	.35	.45	.22½	.30	.25	.28
6" on 10" "Y" "	435	.36	.40	.45	.60	.30	.30	.35	.34
6" on 12" "Y" "	70	.46	.45	.55	.75	.37½	.30	.40	.50
Manholes	61	34.00	30.00	40.00	41.00	.28	29.00	35.00	40.00
Flush tanks	20	75.00	75.00	75.00	75.00	.55	50.00	70.00	65.00
Lamp holes	0	10.00	7.50	.....	8.00	.....	7.50	.....	10.00
Cu. yds. concrete	20	10.00	8.00	6.00	8.00	6.00	5.00	4.00	4.00
Ft. B. M. lumber	20,000	30.00	.....	20.00	25.00	30.00	20.00	15.00	27.50
Septic tank	1	2,380.00	1,900.00	2,200.00	2,100.00	2,500.00	1,900.00	1,550.00	1,850.00
Total		$24,530.69	$20,768.80	$20,516.30	$28,782.35	$21,576.18	$17,859.22	$15,646.77	$19,218.09

*Contract awarded.

curb and gutter on Iowa, 24th, 29th and 12th sts. were close and referred to the City Engineer for a report.

F. J. Sulsbach was awarded the contract for a sewer on Isabella st.

Louisville, Ky.—The Blackstaff Engineering Co., of Philadelphia, Pa., being the lowest bidder, was awarded the contract for the construction of Section A of the northeastern sewer by the Sewerage Commission. The contract is one of the largest in connection with the local sewer work, and it is said will amount to slightly more than $150,000. Among the other bidders for the work were Nave Bros., of Portsmouth, O.; Bickel & Co., of this city, and Schnable & Quinn, of Chicago.

Gloucester, Mass.—The L. E. Smith Co. have been awarded the contract for furnishing drain pipe for the catchbasins to be constructed on Commonwealth ave. and culvert on Leonard st., Annisquam, at their figure, $151.47; the other bids were L. E. Andrews & Co., $153.05, and Albert R. Cole, $214.

Omaha, Neb.—In addition to a large number of paving contracts, one good sized sewer contract was let by the Council for a main sewer to be laid on Leavenworth st. from 42nd st. to 46th st., at a cost of $13,000; the contract was let to McKay & Cathroe.

Brooklyn, N. Y.—Bids were opened, May 19, by Bird S. Coler, Borough President, for a sewer in Troutman st. from St. Nicholas ave. to the borough line; bids were submitted on the percentage basis as follows (engineers' estimate, $28,290): United Eng. & Const. Co., 32 East 33d st., New York City, 108½ per cent; Wm. T. McKebben Co., 1170 Broadway, New York City, 113.9 per cent; J. J. Creem Co., Brooklyn, 77.9 per cent.; Long Island Contr. & Supply Co., L. I. City, 92.7 per cent; Sigretto & Bonacci Co., Brooklyn, 88 per cent; Palladino & Co., Brooklyn, 89⅞ per cent; Newman & Carey Co., Brooklyn, 93.73 per cent; Vincent Mennino, Brooklyn, 90 per cent; L. E. Kelly, Brooklyn, 97 per cent; J. J. Hagerty, 298 Gold st., New York City, 102 per cent; Donigan & Redmond, Brooklyn, 98 per cent.

New Brighton, S. I., N. Y.—Bids were received May 18 for furnishing all the labor and materials required for constructing a temporary combined sewer with the necessary appurtenances through an easement on Lyman ave., from Summer st. to Tomkins ave., in Tomkins ave. from Lyman ave. to Valley st., and in Valley st. from Tomkins ave. to Duer ave., all being Sewerage District No. 6A, Fourth Ward, together with all work incidental thereto; Joseph Johnson's Sons, West New Brighton, S. I., $38,909; Gore-Meenan Co., 206 Broadway, New York, $40,003; N. J. Quinlan, $47,415; John E. Donovan, 117 West 26th st., New York, $49,725; Sigareto & Bonnacci, $44,635.—George Cromwell, Borough President.

Canton, O.—Nine short sanitary sewer contracts were awarded by the Servers May 22. Seven jobs were given to John Skeeles and one each to Peter Christiansen and the Canton Cement and Specialty Co. Contractor Skeeles will build sewers as follows: Cedar st. from Park ave. west; Cedar st. from High to Grant st.; Newport st. from Prospect st. west; Louis ave. and alley west of McKinley ave.; Oakwood ave. from Clarendon ave. west; first alley east of B. & O. Railroad and south of South st.; Scoville ave. Peter Christiansen will build a sewer on Belden ave. and the Canton Cement & Specialty Co. a sewer in the first alley south of Hane st.

East Liverpool, O.—Contract for sewering a number of streets in Sewer District No. 1 has been awarded to J. C. Cunningham by the Service Board.

Middletown, O.—Hecker & Kirschner, Dayton, have secured contract for constructing sanitary and drainage sewers in 4th st., Garfield ave., Leibee st., Young and Fairmount aves.; John Arpp, Jr., for sanitary and drainage sewer in Jacoby ave.

Guthrie, Okla.—Contractor W. F. Power, city, has been awarded the contract for building main sewers 11 and 12, between Warner and Mansur aves. and Mansur and Logan aves. from 4th to 14th sts., at $2,360.36 each, and for district sewer No. 49 in Guthrie at a cost of $1,402.25.

Miami, Okla.—Will F. Plummer Co., Springfield, O., has received contract for construction of proposed system of sanitary sewers.

Cambridge Springs, Pa.—Contractor Thos. McGuigan, of Meadville, has the contract for 18 and 8-in. sewers authorized by Ordinance No. 159 of this borough, and has begun work.

West Hazleton, Pa.—Borough Council has let the contract for an 8-in. terra-cotta pipe sewer, 145 ft. in length, on North 4th st., to connect with the Oak st. sewer, to T. A. Willis, for $125; Henry Fichter, bid $312.50; Henry Koch, $250.85, and Julius Schneider $140.65.

York, Pa.—Contracts for the extension of the Jackson st. sewer and for the guttering of School alley, in the West End, were awarded by the Highway Committee of Council to the General Supply & Construction Co. at $4.20 per lin. ft.

Spartanburg, S. C.—P. J. O. Smith has contract to construct sewers on Wofford College campus and Hall st. at cost of $4,000.

Aberdeen, S. D.—City has decided to put in 23 blocks of storm sewer, the contract for the work being granted to Andrew Detling, the city furnishing the material. The price varies from about 30c. to 80c. per running foot, according to the nature and depth of the excavations.

Huron, S. D.—F. M. Harris, representing Fanebust & Sons, of Sioux Falls, has signed a contract with the city for the construction of the new sewer system, the contract being in round numbers $50,000. It is stipulated that the 3d st. sewer, from the Great Northern railway tracks to the river, shall be completed September 1; the Ninth st. sewer is to be completed December 1. Failure to complete the work at the specified dates, the contractor stipulates to pay a fine of $50 a day for each day overreaching the dates named. Work will begin at once.

Nashville, Tenn.—The Board of Public Works, May 20, opened bids for the construction of a sewer in an alley between Forrest and Gartland sts. extending from 11th ave. to a point beyond 12th ave., and the contract for the work was awarded to Curtis & LeSueur at a bid of $889.15.

Barstow, Tex.—The contract for digging about 31 miles of drainage ditches in this district was let to the Northwestern Drainage Co., of Grand Rapids, Wis.

Provo, Utah.—J. D. Hanley, of Salt Lake, submitted low bid for constructing sewer in District No. 10 at $11,911.52, as follows: 3,894 ft. 12-in. circular vit. clay pipe, shell 15-16-in. thick, in trench 11.4 ft. deep, small quantity of ground water to be handled, 2,212 ft. 10-in. pipe, ¾-in. shell, in 8.7 ft. trench, 2,467 ft. 6-in. pipe, ⅝-in. shell and 8.9 ft. trench.

David S. Heuser was low bidder in District No. 10 at $15,500, as follows: 6,310 ft. 8-in. circular vit. clay pipe, ¾-in. shell, in 9.9 ft. trench, gravel and sand to be excavated, and 4,813 ft. 6-in. pipe, ⅝-in. shell and 8.2 ft. trench; wages of common labor, $2 per day.—E. A. Jacob, City Engineer.

Norfolk, Va.—On a competitive bid, May 22, the Board of Control awarded the contract for the construction of concrete drainage from Newton Creek to J. T. McGuire, of Greenville, N. C. Mr. McGuire's bid was $6 per ft. for 5-ft. drain; $5 for 4-ft. drain, and $30 for each manhole. The highest bidder was J. W. Davis, of Newport News. He proposed to construct a 5-ft. drain at $8.88; 4-ft. at $6.38 per ft., and manholes at $110 each. Other bidders were Sands & Key, Specialty Construction Co., L. Lawson, Guild & Co.; there remains $19,000 with which to drain the creek.

Portsmouth, Va.—Bids were opened, May 10, for furnishing and installing two pairs of ejectors for lifting sewage and constructing two c.-i. chambers, within which to erect ejectors, with all connections, complete, etc., and the contract has been awarded to the Shone Co. for $18,900.—Bascom Sykes, City Engineer.

Martins Ferry, W. Va.—The Board of Service has let contract to the Dixon & Pickett Co. for the first district sewer. Their bid, of something over $5,200, was the lowest of six bids received and the successful firm expects to start work at once.

Beloit, Wis.—The Board of Public Works, Jos. L. Hendley, Chairman, has recommended and Council awarded contract for construction of storm water sewers to O'Shea & Shea for $7,671.99; other bids on the work were: G. Maffioli, $8,648.28; J. C. Clarke, $8,920.80; O'Farrell Constructing Co., $8,942.34; E. K. Harding Co., $9,430.10; A. Thomsen, $8,817.06; Eul & Cochrane, $7,990.64; Carmine Robert, $9,651.90; S. Vandewalker, $8,659.90; Wm. Davidson, $9,809; M. Ponterello, $10,332.55; N. F. Reichert, $8,967.34; John Green, $11,121.75; Rink & Schnell, $9,123.66; Rob. Nelson, $10,262.59; E. & J. McGavock, $11,818.40.

Columbus, Wis.—Eul, Cochens & Nebel have been awarded a contract for constructing sewers as follows: 722 ft. 10-in. vit. tile, 8 ft. deep, in hard pan, under macadam pavement, for 62c. per lin ft.; 3,330 ft. 8-in. vit. tile, 8 ft. deep, in hard pan, under macadam, for 54c. per lin. ft. The mean of all bids was 63c. and 56c., respectively. Eight manholes at $24, rock excavation at $4.50 and lumber at $30 per M, were also included. Totals of all bids were: Advance Construction Co., $2,655; Columbus Heating & Plumbing Co., $2,589.66; Wilson F. Brunt, $2,523.20; Eul, Cochens & Nebel, $2,462.84; E. L. Bartlett, $2,637.40; wages of common labor, $1.75.—W. G. Mack, City Engineer.

De Pere, Wis.—A contract for the building of an alley sewer in Block 48 was let to Vanremortel & Bloomers.

Watertown, Wis.—W. F. Brunt, Hammond, Ill., was lowest bidder, May 11, for constructing sanitary and storm sewers, at $12,442. Engineer's estimate, $17,500. The Board of Public Works has recommended adoption of bid.—Arnold Kraeft, City Engineer.

WATER SUPPLY

Dothan, Ala.—City has selected J. B. McCrary & Co., Empire Bldg., Atlanta, Ga., to design and supervise construction of water works, electric light plant, sewer system and street paving; total expenditure about $100,000; plans will be completed in 60 days.—H. W. Lisenby, Clerk.

Heflin, Ala.—Plans are being prepared by J. B. McCrary & Co., Empire Bldg., Atlanta, Ga., for proposed water works and electric light system.

Lafayette, Ala.—Plans are being prepared by J. B. McCrary & Co., Empire Bldg., Atlanta, Ga., for proposed water works.

Tuscaloosa, Ala.—The Water Commission is considering improvements to water works, including new boilers and extensions to water mains.

Jonesboro, Ark.—City will construct a $5,000 reservoir.

Oakland, Cal.—Better fire protection in various portions of the city is the purpose of a conference between representatives of the People's Water Company and members of the City Council, which has been arranged; larger mains and extension of lines into districts which are building up rapidly is the object; Council has directed placing of fire hydrants as follows: Miles ave., 21st ave. and East 15th st.; 21st ave. and East 16th st.; 21st ave. and East 17th st; 21st ave. and East 19th st.; 21st ave. and East 20th st., corner Jean st. and Ellwood ave., and Mira Vista ave. and Ellswood ave.

San Francisco, Cal.—F. P. Bergen, associated with W. S. Williams, Engineer of the Civic League, will visit a number of Eastern cities for the purpose of studying fire protection systems now in operation in order to obtain information to be utilized in the installation of the 300-lb. pressure system in this city.

San Francisco, Cal.—A bill has been passed to print providing $3,600 out of the proceeds of bonds to enable the Board of Public Works to enter into contracts for the construction of the following fire cisterns: 13th and Folsom sts., 16th and Capp sts., 18th and Harrison sts., 18th and Capp sts., 19th and York sts. and Mariposa and Kansas sts.

San Francisco, Cal.—Plans for the construction of the big reservoir on top of the Twin Peaks will be completed very soon, and there will be no unnecessary delay in letting the contracts and proceeding with the work.

Norwalk, Conn.—City has decided to construct water works; cost $70,000.—Chas. N. Wood, City Engineer.

Washington, D. C.—Henry B. F. Macfarland, Henry L. West and William V. Judson, District Commissioners, have approved recommendations of engineer department for following improvements: 4-in. water main, 100 ft., in alley between 14th and 15th sts., C st. and South Carolina ave., 8-in. water main, 510 ft., in Hamlin st.; 8-in. water main, 370 ft., in High st.; 8-in. water main, 405 ft., in 18th st. N. E.; 8-in. water main, 90 ft., in T st.

Madison, Fla.—Citizens will vote on $5,000 bonds for the extension of water mains.

Fort Gaines, Ga.—City will construct water plant, build additional reservoir and increase size of mains.

Hazlehurst, Ga.—City has selected J. B. McCrary & Co., Empire Bldg., Atlanta, to prepare plans for water works; $18,000 bonds are available.

Rockmart, Ga.—Plans are being prepared by J. B. McCrary & Co., Empire Bldg., Atlanta, for proposed water works; city will open bids for construction in late August or early September.

Orofino, Idaho.—The Orofino Improvement Co. has been granted a franchise to install a gravity water system to supply the town with spring water; supply is secured from a series of springs.

Fairfield, Ill.—Mayor D. H. M. Pitner is urging the installation of a system of water works.

Jacksonville, Ill.—City is considering the matter of improving and caring for the city water system.

Nashville, Ill.—Citizens are considering the construction of water works.

Greenfield, Ia.—Council has authorized the issuance of $25,000 for water works construction; bonds have been contracted for by George M. Becytel & Co., of Davenport.

Little Rock, Ia.—Citizens have voted $8,000 bonds for the construction of water works.—Turner, Roland Co., Des Moines, Engineers.

Marshalltown, Ia.—City will build a new water storage tank of 100,000 gallons capacity, in order to better equalize the water pressure in the event of extra pressure being placed on the mains.

New Reppey, Ia.—City will construct a water works system and well; cost $7,000.—Grant Van Horn, Mayor.

Meade, Kan.—City has selected the J. S. Worley Co., Engineers, Reliance Bldg., Kansas City, Mo., to prepare plans and specifications for a water works plant here.

Newport, Ky.—The Commissioners of Water Works will arrange for improvements to cost $85,000; standpipe with capacity of 150,000 gallons will be constructed and two pumps with daily capacity of 5,000,000 gallons installed; three miles of 20-in. auxiliary supply mains and a mile or more of smaller pipe will be laid.—John W. Hill, First National Bank Bldg., Cincinnati, Consulting Engineer.

Baltimore, Md.—Formal action approving the plans for the proposed $500,000 high pressure fire fighting pipe line system will be taken by the Fire Board very soon.

Oakland, Md.—The Second National Bank of Cumberland took the entire issue of $45,000 of water works and sewerage bonds at $1.06.

Towson, Md.—Aigburth Well Co. has been incorporated with $10,000 capital stock by Albert S. Cook, T. Scott Offutt and W. Clarence Craumer, to furnish town and vicinity with artesian water from Aigburth wells.

Attleboro, Mass.—Citizens have voted $15,000 bonds for the extension of the water system.

Chicopee, Mass.—The Fairview water bill has been signed by Governor E. S. Draper and this city is now empowered to raise $28,000 for the purpose of giving Fairview a supply of water.

Gloucester, Mass.—Town has voted $1,300 to extend water mains from Mt. Pleasant st. through Norwood ave. to Clark ave.

McKinley, Minn.—Town has decided to install an improved water works system.

Shakopee, Minn.—Council is considering an ordinance to issue $30,000 bonds for the extension of the water works.

St. Paul, Minn.—The Board of Aldermen has approved a $50,000 water works bond issue.

Gulfport, Miss.—Plans and specifications are being prepared for water works improvements; $40,000 bonds will be issued for extensions and installation of additional pump of 1,000,000 gallons capacity.—M. F. Sullivan, City Engineer.

Kansas City, Mo.—City has postponed date of election to July 13 for voting on $4,125,000 bonds for following improvements: Water works improvement, $1,500,000; 12th st. traffic way, $350,000; river front improvements $75,000; park improvements, $750,000; to purchase Chace school, $25,000; for house of correction, $75,000; for six new fire stations, $150,000; Market square improvements, $125,000; street repair plant, $50,000; incinerating plant, $200,000; tuberculosis hospital, $25,000; Third Regiment Armory, $250,000; Battery B Armory, $75,000; general sewer purposes, $300,000; art museum, $175,000.

St. Louis, Mo.—The Board of Public Improvement has rejected all bids received for water pipe, and will receive new bids; contract amounts to about $150,000.

Diller, Neb.—Citizens will vote, June 15, on $13,000 bonds for the construction of water works from plans of J. F. Caln, of South Bend, Ind.

Lincoln, Neb.—Citizens have voted water works bonds.

Valentine, Neb.—W. K. Palmer, Engineer, Kansas City, is now engaged in working out details for a water power from the Niobrara River owned by C. H. Cornell, for development of the water power and constructing and operating an interurban.

Haledon, N. J.—Borough will hold a special election just as soon as arrangements can be made to decide whether or not the Board of Council may raise sufficient money by bonding the municipality to complete the water works system.

Paterson, N. J.—The Board of Works has adopted resolutions for the installation of five fire hydrants..

Portales, N. M.—Citizens have voted $75,000 bonds for water, light and sewer systems.

Trenton, N. J.—City is considering a plan to purchase the property of the Trenton Water Power Co., upon which an option has been secured at $80,000, and to employ the stream principally as a source of the city's water supply. In addition the proposition contemplates the establishment of sedimentation basins in the vicinity of Cadwalader Park and the use of this almost unlimited natural flow through the present pumping station at Calhoun st.

Avoca, N. Y.—Village will sell $18,000 bonds June 7, 2 p. m., for the purpose of building a system of water works.—A. J. Arnold, Clerk.

Buffalo, N. Y.—Governor Hughes has signed the bill increasing the amount of water bonds the city can issue from $2,000,000 to $3,000,000 for water main extension.

Manhasset, L. I., N. Y.—The people of this village have applied to the Town Board for the establishment of a water district.

New York, N. Y.—Bids will be received June 8 by Comptroller Metz for $10,000,000 4 per cent bonds for the Water Department.

Peekskill, N. Y.—Citizens have voted $20,000 bonds to complete filtration system already under way; $15,000 bonds for a new dam and storage reservoir at the pumping station, and $45,000 bonds to build a high pressure system to force water to hills about the village.

Asheville, N. C.—City will construct concrete reservoir of 250,000 gallons capacity; cost, $20,000.—J. B. McCrary & Co., Empire Bldg., Atlanta, Ga., Engineers in Charge.

Wilmington, N. C.—City has selected Hazelhurst & Anderson, Consulting Engineers, Candler Bldg., Atlanta, Ga., to design and construct systems of water works and sewers and for which $500,000 is immediately available; surveys will be commenced at once.

Bottineau, N. D.—S. F. Crabbe, Fargo, who has been engaged by Council to investigate the water works and sewer proposition, spent some time with a party composed of members of the Council and Commercial Club investigating the springs in the mountains north of the city to ascertain the feasibility of getting a water supply from that source.

Dayton, O.—City Engineer Cellarius nas submitted plans for the new pumping station to the Servers, and the Board approved them; estimated entire cost, $15,000; one test well has been sunk and the Board expects to have a report from the State Board of Health as to the purity of the water within about two weeks.

Dayton, O.—Superintendent of Construction Heffernan of the Water Works Department has submitted the following estimates on water pipe construction to the Servers: Perry from Fifth st. to the D. & U. roundhouse, $427.60; Gunkle from Gebhart to Erie, $272.16; Carrie from present connection to Perry, $43.77.

Girard, O.—Henry R. Fothergill, Girard Water Co., and Councilmen Fuller, Thomas and Stotler have conferred with Fire Chief Loller, Youngstown, whose advice was sought as regards the fire plugs and other equipment which is likely to be installed in connection with the water works system now being constructed.

Urbana, O.—City has retained Engineers John W. Hill & Son, First National Bank Bldg., Cincinnati, O., to prepare plans for a water works plant; cost, $125,000.

Capitol Hill, Okla.—The Board of Trustees accepted plans and specifications for water works system; site for standpipe will be purchased and then bids will be invited; cost, $35,000.

Carmen, Okla.—City will open bids in about twenty days for construction of water works; $30,000 bonds have been voted.—O'Neil Engineering Co., Dallas, Tex., Engineer in Charge.

Ryan, Okla.—Citizens will vote on bonds for water works and an electric light plant; cost, about $69,000.

Taloga, Okla.—F. W. Murch, Clinton, Okla., is preparing plans for water works system; $16,000 bonds will be voted.

Yukon, Okla.—Citizens will soon vote on $25,000 bonds for constructing a system of water works.

Joseph, Ore.—Bids will be received June 10, 6 p. m., for the sale of $20,000 of 6 per cent semi-annual water works bonds.—Augustine White, City Recorder.

Portland, Ore.—The Water Board will build two reservoirs on the west slope of Mount Tabor to be part of the water system of the city. It is intended that they shall be part of the park system of Mount Tabor, and will be built with this in view.

Bethlehem, Pa.—Bids will be received about July 1 for the construction of the proposed water works—R. E. Neumeyer, Borough Engineer; Alex. Potter, New York, N. Y., Consulting Engineer.

Bristol, Pa.—Borough is contemplating the building of new water works, the decision of the courts sanctioning the same, and the engineers will soon be selected.

Clearfield, Pa.—The Clearfield Water Co. plans to spend thousands of dollars in the erection of additional reservoirs; a larger one will be built within 800 ft. of the dam on Moose Creek and will have a capacity of 16,000,000 gals. of water; other reservoir will be on Cemetery Hill and will be known as the distributing reservoir; will have a capacity of about 2,000,000 gals.

Coraopolis, Pa.—The Water Committee has reported that its intention to lay a 4-in. cast iron water line on Chestnut st. between Ridge and Vance aves.

Lebanon, Pa.—The Lebanon Valley Consolidated Water Supply Co. has purchased a tract of land from Sheriff Elias Gerhart at Jonestown, located about 1,000 ft. above the big iron bridge on Main st., that Borough, and will shortly erect a big pumping station and filter plant on the site which is on the banks of the Big Swatara Creek; C. E. Schaup, the Engineer, employed by the company to design and construct its water supply system, is in charge of the project.

Temple, Tex.—Citizens will vote, June 22, on $100,000 water bonds.

Colton, S. D.—Citizens have voted $8,000 bonds for constructing a system of water works; plans and specifications have been made by S. B. Howe, C. E., Sioux Falls.—Louie Clarke, Town Clerk.

Donald, S. D.—Plans are being prepared by Consulting Engineers McDaniel & Trimmer, Vermilion, for a water supply system.

Bristol, Tenn.—City, which extends municipal ownership of the water system, is planning the installation of the meter system, as a means of increasing the revenues

of the system and checking what is said to be a useless waste of water; it is estimated that it will cost $15,000 to install the system.

Clarksville, Tenn.—Council has authorized Water Committee, C. L. Perkins, Chairman, to secure estimates on horizontal pump to be installed in filter plant and also on concrete floor for the plant.

Aspermont, Tex.—City is considering construction of water works.

Calvert, Tex.—The Calvert Water, Ice & Electric Light Co. will expend $40,000 in improvements to plant.

Canyon, Tex.—Citizens will request Council to submit the proposition to vote bonds to the amount of $33,000 for the purpose of installing a water works and sewerage system; election will accordingly be ordered for an early date.

Corpus Christi, Tex.—Citizens will vote on $90,000 bonds for water works improvement.

Cuero, Tex.—Council will soon receive bids on drilling artesian wells to supply water.

Hereford, Tex.—City has selected John B. Hawley, Fort Worth, as engineer to prepare plans and specifications and superintend construction of water works; $25,000 bond issue available.

Lancaster, Tex.—Citizens are discussing plans for the improvement of the city water works; it is proposed to lay about 3,500 ft. of new mains, thereby giving service to all parts of the town; proposed improvements will cost about $5,000.

Milford, Tex.—City will begin work on a water works system as soon as the plans are prepared by the Engineer and approved by the Council.—John B. Hawley, Fort Worth, Engineer in Charge.

Temple, Tex.—Council has appropriated $15,000 for relaying water mains in proposed paving district.

Tyler, Tex.—Council has decided to submit to the taxpayers the proposition to lay additional water mains throughout the northern part of the city.

Appalachia, Va.—City will issue $50,000 of bonds for construction of water works and has invited estimates.

Lynchburg, Va.—The Southern Railway Co. will construct a reservoir on top of Candler's Mountain, four miles below Lynchburg, with a capacity of about 500,000 gallons.—W. H. Wells, Washington, D. C., Construction Engineer.

Burlington, Vt.—The Water Department, Superintendent Kidder, will soon purchase a new meter for the high service which will be set to work in connection with the fire service.

Swanton, Vt.—Citizens are considering the issuing of bonds to be used in payment of the new village water system.

Asotin, Wash.—Preliminary surveys are being made by D. H. Guilland, of Lewiston, Idaho, for the proposed water works and electric light plant; bids will be called for about September.

Oroville, Wash.—City will expend about $12,000 for constructing pumping plant and reservoir.—E. S. Taylor, City Clerk.

Seattle, Wash.—The next contract to be awarded by city in connection with the second pipe line from Cedar River will cover that territory lying between Roanoke st. and the new reservoirs and will include a pipe line under Lake Union.

Tacoma, Wash.—Superintendent of Water Whitney has been instructed to establish a fire hydrant district in the west half of the school section.

Wilbur, Wash.—Bids will be received after June 14 for water works improvements; cost, about $10,000.—L. A. Sheppler, Engineer.

Martin's Ferry, W. Va.—City will spend something like $3,000 for new boilers at the city water works pumping station; present boiler is only 150-h.p. capacity and the Superintendent has asked for one with at least 250 h.p.

Martin's Ferry, W. Va.—The Superintendent of the Water Works will take measurements and contracts will be left shortly for an extension of the city water mains to Spring st. in Burlington, to supply the families just outside the north corporation limits.

Princeton, W. Va.—The Princeton Water Works Co. has retained F. B. Van Antwerp, 200 Bond Bldg., Washington, D. C., as engineer in charge of constructing proposed water works; water to be supplied from wells; equipment will include boilers, pumps, air compressor, pipe and hydrants.

Wheeling, W. Va.—City is considering installation of filtration system; Municipal Filtration Co., Detroit, Mich., will submit estimate of cost.—C. C. Smith, City Engineer.

Fond du Lac, Wis.—The Fond du Lac Water Co. has decided to install a 125-h.p. boiler.

Hull, Que., Can.—City Engineer Farley has estimated the cost of extending the water works system at $18,000.

BIDS RECEIVED AND CONTRACTS AWARDED

Oakland, Cal.—The Board of Works received bids for the construction of auxiliary salt water pumping plants for filling street sprinklers and referred them to the City Engineer and City Attorney; the Krogh Manufacturing Co. was the lowest bidder at $1,082.

Denver, Col.—The Denver Reservoir Irrigation Co. has awarded to Rosser & Whittaker, of Minneapolis, Minn., the contract for enlarging the intakes to the Standley and Barr Lake reservoirs; cost, about $400,000.

Council Bluffs, Ia.—Contract for a well which is expected to supply Fairmount Park with sufficient water for all purposes, and to make it independent of the city water supply, has been let by the Board of Park Commissioners to C. A. Killian, of Morse Bluffs, Neb. It is the intention to install an automatic electric pump and to raise the water to a reservoir situated on the highest point in the park, from which it will be distributed to all parts of the park tract. The Park Commissioners expect the total cost of the improvement to be about $3,000 to $3,500. The well is to be four inches in diameter and will probably be put down from 300 to 500 ft.

State Center, Ia.—Schilling Bros., State Centre, have been awarded contract for labor and material, as follows; 2,650 ft. 4-in. mains, 8 ft. 6-in. mains, seven 6-ft. Eddy fire hydrants, two 2½-in. openings, four reducers, 6-in. to 4-in., six 4-in. tees, one tee, ends 4-in., side 6-in., three 4-in. plugs, one 4-in. elbow, jute and lead, at $1,605; other bids received were: E. R. Silliman, Colorado, $1,700; Geo. M. King Construction Co., Des Moines, $1,818.94; Guy E. Smith, Indianola, Ia., $1,768; Helmers & Eitel, Minneapolis, $3,257.10; Des Moines Bridge & Iron Co., Des Moines, $1,795; Geo. H. Merridith, Cedar Rapids, Ia., $1,904; Anderson & Nelson, Boone, Ia., 79½c. per ft.—W. J. Whitehill, Clerk.

Alexandria, La.—The City Board of Aldermen, May 20, awarded a contract to Oscar Shanks to bore an artesian well for the city; the well is to be not less than 600 ft. deep, 12 ins. in diameter and to furnish 300,000 gallons in 24 hours.

Berlin, Md.—City awarded contract to Fairbanks-Morse Co., of New York, to construct water works and electric light plant; equipment includes power-driven pump (built by Platt Iron Works Co., Dayton, O.) with daily capacity of 800,000 gallons (per day), to be furnished by Morton McI. Dukehart; 413 Continental Bldg., Baltimore, Md.; Dodge & Day, Washington Bldg., Philadelphia, Pa., are engineers in charge.

Ashfield, Mass.—Contract for building a stone and concrete dam about 80 ft. long and 10 ft. high, and for repairing about 1¼ acres of land for a storage reservoir, has been awarded by the Ashfield Water Co. to H. W. Warner, Florence.—Charles H. Wilder, Secretary.

Concord, Mass.—Bids were opened as follows, May 20, by the Water and Sewer Commissioners for building an intake in Nagog Pond and laying c.-i. pipe and appurtenances in Acton and Concord; Henry Spinach Contracting Co., Waterbury, Conn., $17,872; Cenedella & Co., Milford, Mass., $20,552; Joseph Long, Leominster, Mass., $23,020; C. E. Trumbull Co., Boston, $27,575; John E. Palmer, Boston, $28,500; the Farnum-Hanscom Co., Boston, $29,651; Frank Williams & Bro., Boston, $31,766; F. B. Williams & Co., Boston, $33,230; Michael Little & Co., Leominster, $41,315; Bruno & Petitti, Boston, $41,730; M. Russo, Boston, $42,124; Tony Ross, Woburn, $48 298.—Metcalf & Eddy, 14 Beacon St., Boston, Engineers.

Marblehead, Mass.—The Ryan & Unmack Construction Co., New Haven, Conn., has been awarded the filtration plant contract, won in a competitive bid in which there were twelve contractors entered from various parts of the country. The filtration plant is to have a capacity of 3,000,000 gallons, and it will be similar in construction to those built by the Ryan & Unmack Co. at South Norwalk and Dover, N. H. It will cost about $50,000. Mr. Ryan also built the filtration plant at Lake Whitney for the New Haven Water Co.

Minneapolis, Minn.—The Water Committee of the Council, May 11, awarded contract to the Pittsburg Meter Co., East Pittsburg, makers of the Keystone meter, for 3,800 meters.

Harlem, Mont.—W. D. Lovell, 1415 8th st., S. E., Minneapolis, Minn., has secured contract for installing water system at Fort Belknap Indian Agency.

Helena, Mont.—Contracts have been awarded for furnishing headgates for use in connection with the Dodson Dam, and main canal, Milk River project, Montana, as follows: New Jersey Foundry & Machine Co., New York, 15 gates, 3 ft. 11¼ ins. x 4 ft. 11¼ ins. clear opening, each with gate frame and guides, $1,035; the Coffin Valve Co., Boston, Mass., 15 gate stands and gate shafts, $3,000.

Albany, N. Y.—The contract for supplying the Water Bureau with 200 hydrants has been awarded to the Eddy Valve Co., of Waterford, N. Y., at $6,470.—Walter Melius, City Engineer.

Buffalo, N. Y.—The B. I. Crooker Co., Builders' Exchange, Buffalo, has submitted the lowest bid, May 14, to the Board of Public Works for entire work of building the new pumping station at Porter ave., at $383,921; other bidders were Mosier & Summers, $399,500; John Lannon, $415,000; bidders on a portion of the work were as follows: Timothy McEvoy & Son, $3,984 for heating and $7,892 for plumbing; Dark & Co., $3,712 for heating and $7,142 for plumbing.—F. G. Ward, Commissioner.

Glens Falls, N. Y.—Bids were received as follows on May 20 by the Board of Water Commissioners for constructing an earth reservoir dam, about 75 ft. high, with a concrete core wall, on the Butler Brook, about five miles from the city: Kasson Construction Co., Glens Falls, $126,375; Lee, Lehan & Co., Fort Edward, N. Y., $117,020; Shanley Morrisey, New York, $104,325; E. D. Baker, Binghamton, N. Y., $92,818; Sherman, Parker & Beebe, Utica, N. Y., $85,285; D. Cuozzo & Co., New York, $84,370; A. B. Purnell, Pittsburg, Pa., $83,270; Bunting Bull Co., New York, $82,646; Francis J. Boas, Philadelphia, Pa., $74,962; Linehan & Burnham, Glens Falls, $73,631; Kingsbury Construction Co., Sandy Hill, N. Y., $72,110.—Howard M. West, Superintendent Water Works.

Long Island City, L. I., N. Y.—Bids were opened May 19 by J. H. O'Brien, Bureau of Water Supply, Gas and Electricity, to furnish and lay water mains in Long Island City, Flushing, Douglaston and Whitestone, Queens Borough, and the lowest bid was that of John J. Hagerty, 298 Gold st., New York City, at a total of $67,123, including pipe, hydrants, valves, etc.: 1,240 tons straight pipe, $24.40; 73 tons brass and special castings, $50; 114 tons valve boxes, $34; 100 cu. yds. rock excavation, $3; 500 cu. yds. extra earth excavation, $1.20; 48 lin. ft. 20-in. pipe, $1; 48 lin. ft. 16-in. pipe, $1; 7,000 lin. ft. 12-in. pipe, 42c.; 34,700 lin. ft. 8-in. pipe, 35c.; 1,500 lin. ft. 6-in. pipe, 30c.; 5,900 sq. yds. macadam pavement, 30c.; totals of other bids: Robertson & Gerhart, Brooklyn, $73,605; Pease Bros., Flushing, L. I., $71,773; H. E. Fox, 60 West 125th st., New York City, $75,876; Wilton Construction Co., 115 Elliot ave., New York City, $69,598; Long Island Contracting & Supply Co., Long Island City, $69,492; Soraci Construction Co., 170 Broadway, New York City, $76,248; Hanover Contracting Co., 215 West 125th st., New York City, $103,786.

Troy, N. Y.—The Board of Contract and Supply, May 21, awarded to the U. S. Cast Iron Pipe & Foundry Co., the contract for water pipe for the proposed Mann ave. water service at $22 per ton for 8-in., $22.90 for 6-in. and $50 per ton for specials.

Miamisburg, O.—The Board of Public Affairs awarded the following contracts: Furnishing pipe, the Dimmick Pipe Co., Cincinnati, 2,000 tons 4-in., $24.75; 2,000 ft. 6-in. and 2,000 ft. 8-in., at $24.35; laying pipe, Sullivan & Ryan, 3,906 ft. 4-in., at 16c.; 2,068 ft. 6-in., 18½c.; 1,308 ft. 8-in., at 22½c., all in 4½-ft. trench; fire hydrants, Bourbon Copper & Brass Works Co., one hydrant with 6-in. connection and 2½-in. nozzle, 4½-ft. trench, $44; seven with 4-in. connection and 2½-in. nozzle, in 4½-ft. trench, at $21; also for gate valves, one 8-in., $17.25; two 6-in., $12.75; six 4-in., $9.—H. W. Albrick, Clerk.

Reading, Pa.—Bids were opened May 24 for furnishing filtering sand for the Bernhard and Maidencreek filtering plants, which are rapidly nearing completion; they were as follows: Reading Supply Co., Reading, $40,215; Norcross & Edmunds, Philadelphia, $71,450; National Dredging & Literage Co., Philadelphia, $47,875; C. D. Miller & Son, Reading, $40,215; G. C. Smith, Reading, $40,215; after going over the bids in executive session it was decided to award the contract to C. D. Miller & Son, of this city, as the sand they submitted showed a better test than the others, which were offered at a like figure.

Calvert, Tex.—Calvert Water, Ice & Electric Light Co. will make improvements to plant, expending $40,000; G. W. Sonnerfield, Dallas, has contract to erect new building.

Denison, Tex.—The following are the bids opened, May 11, by City Council for the new water works dam, (a) complete, (b) partial construction: A. D. McCord, Dallas, a $50,599; Larkin Construction Co., Dallas, a $59,186; Irvine & Mills, Sherman, b $40,487; McSweeney Bros., Houston, b $38,299.

Norfolk, Va.—The Board of Control, May 25, awarded to M. J. Drummond & Co., through their Norfolk agent, J. M. Umstad-

ter, a contract for furnishing the Water Department 1,000 ft. of c.-i. pipe at $24.10 per ton and a small quantity of fixtures.

Seattle, Wash.—Eleven bids were received by the Board of Public Works for the construction of Subdivision No. 4 of the Cedar River water supply system, extending from a point near Volunteer Park to Lake Union at Roanoke st., a part of the pipe line system to supply the two new reservoirs at Green Lake. The new pipe is to be of staves and connect with the present 42-in. pipe at a point 250 ft. west of the intake at Volunteer Park. The lowest bid was submitted by B. H. Graff, at $26,968.50; the other bids were as follows: C. W. Coit & Co., $27,576.80; Sparger Concrete Co., $32,595; International Contract Co., $32,559.50; Stirrat & Goetz, $37,167.50; Elliott Bay Iron Works, $29,666.50; M. A. Maher, $30,392; Grant, Smith & Co., $32,843; H. M. Sanfield, $34,625; E. T. Smart & Co., $29,880; C. F. Graff, $30,850.

Sparta, Wis.—Council, May 14, awarded contract for the new water tanks to the Chicago Iron & Bridge Co., 105th and Throop sts., Chicago, at $6,332. There were six bids for the building of the water supply tank to replace the tank now in use. The bids ranged from the contract price to $10,500 for a tank of concrete structure. The new tank will be 40 ft. high and 50 ft. in diameter, with a storage capacity of over 400,000 gallons. The Chicago Iron & Bridge Co. stipulated that they would erect temporary tanks for the city's use during the construction of the new tank and would also furnish a cleaning apparatus with their bid without extra charge to the city.

Waukesha, Wis.—Council, May 13, awarded contract for a new reservoir for the water works to the Advance Construction Co., of this city, at $3,283; other bids were: Marquette Construction Co., Chicago, $6,850; Hoeffner & Co., Chicago, $6,466. The reservoir will be of concrete and have a capacity of 200,000 gallons. It will be located on North st., near the present reservoir. About 30 days will be required for the construction and it is understood that the work will commence at once.

Toronto, Ont.—Bids were opened by Jos. Oliver, May 18, for supply of material and the construction of the necessary works in connection with a water filtration plant, and contracts are reported to have been awarded as follows: To Dill, Russell & Chambers, of Toronto, for main contract, $568,129; to Canada Foundry Co., Toronto, for iron pipe and specials, $10,892; manhole casting, $8,890, and sand washer castings, $871; to Allis-Chalmers-Bullock Co., Montreal, Que., for screw pumps, $7,049, and electrically driven stage pumps, $5,234; to John Macdougall, Caledonian Iron Works, Montreal, Que., for steam centrifugal pump, $9,484, and Venturi meter indicating apparatus, $3,318; to John Inglis Co., Toronto, for drainage pump, $1,600; boilers, $2,750, and Venturi meter castings, $2,891; to Ludlow Valve Co., Troy, N. Y., for gate valves, $8,773, and to Coffin Valve Co., Boston, Mass., for sluice valves, $85,209.—Hazen & Whipple, 103 Park ave., New York, N. Y., Consulting Engineers; C. H. Rust, City Engineer.

LIGHTING AND POWER

Bessemer, Ala.—The Republic Iron & Steel Co. will install an electric plant at its mines at Raimund.

Dothan, Ala.—City has selected J. B. McCrary & Co., Empire Bldg., Atlanta, Ga., to design and supervise construction of electric light and water works systems $20,000 bonds have been voted.—H. W. Lisenby, Clerk.

Geneva, Ala.—The Geneva Power Manufacturing Co. has been incorporated with capital stock of $500,000 by D. O. Vaughan, J. R. Clark, D. G. McInnis, D. H. Morris and A. M. McKinnon to build hydro-electric plant on Double Bridge Creek; will transmit 5,000 h.p. by electricity to Geneva, Enterprise, Hartford, Coffey Springs, Samson and other towns; will also build cotton mill.—D. G. Zeigler & Co., Mutual Life Bldg., Jacksonville, Fla., Consulting Engineers.

Heflin, Ala.—Plans are being prepared by J. B. McCrary & Co., Empire Bldg., Atlanta, Ga., for proposed water works and electric light system.

Delight, Ark.—John Hill has decided to construct electric lighting plant.

Mammouth Spring, Ark.—The Mammoth Spring Electrical & Power Co. has been incorporated by E. R. Parham, F. M. Daniel and others; capital, $10,000.

Searcy, Ark.—The Searchlight Power & Electric Co. will build power house.—Louis Lorch, President.

Fruitvale, Cal.—An election at which Fruitvale will vote upon the matter of forming a district for the maintenance of street lights has been called for June 11 by the Board of Supervisors.

Red Bluff, Cal.—Two notices of appropriation of water have been filed with the County Recorder; first is by E. W. Stores, of Tehama, who has filed on 20,000 inches in Mill Creek to be measured under a 4-in. pressure and the water to be diverted about 14 miles above the junction of Mill Creek with Little Mill Creek; water is to be used in generating electrical power. W. D. Russel, of Paskenta, wants only 500 inches of the water from Bennett Creek, which he will use for irrigation and domestic purposes and also to generate electrical power.

Red Bluff, Cal.—County Surveyor Luning has filed claim on 12,000 ins. of water rights to be taken from Mill Creek by a ditch and flume; water is to be used for generating electrical power.

Jasper, Fla.—City has retained D. G. Zeigler & Co., Mutual Life Bldg., Jacksonville, as Consulting Engineers for proposed hydro-electric plant on Allapaha River; plan is to develop 10,000 h.p. for transmission by electricity to Jasper and to Valdosta, Quitman, Lake Park and Statenville, in Georgia.

Lawrenceville, Ga.—The North Georgia Electric Co. is considering furnishing electricity to city from plant at Gainesville; construction of cable supported by steel towers will cost $15,000.—W. A. Carlisle, Gainesville, President.

Pocatello, Idaho.—J. A. Jones, Chicago, is desirous of installing a gas plant in city

Minco, Okla.—Bids were received for water works and electric lighting construction, and contract was awarded to the Joplin Elec. Supply Co. for the general work; successful bidders in branches of work are marked below by stars.—Burns & McDonnell, Engineers, Kansas City, Mo.

Bidder Specifications	Quantities	Mathew Elec. Con. Co. K. C., Mo.	Squire Elec. Co., K. C., Mo.	Joplin Elec. Supply Co., Joplin, Mo.	Horton & Cunningham, New Orleans, La.	Kerby, Mayfield & Shaw, Lawton, Okla	N. S. Sherman, Oklahoma City	Lund & Cunyan, Blackwell, Okla.
Hauling and laying 4" c. i. pipe	9,444	$0.15	$0.15	$0.16	$0.55	$0.46	$0.16	$0.14
Hauling and laying 6" c. i. pipe	3,336	.20	.17	.18	.49	.65¾	.18	.18
Furnishing and laying 2½" galvanized pipe	1,520	.36	.32	.31	.38	.30	.36	.27
Setting hydrants	20	2.50	3.00	2.00	32.00	26.75	2.00	2.50
Setting valves, 4"	10	1.50	1.00	1.30	12.60	11.00	1.00	1.50
Setting valves, 6"	4	2.00	1.00	1.30	15.00	14.25	2.00	2.00
Setting valves, 2½"	3	1.00	1.00	1.00	7.00	4.00	1.00	1.00
Furnishing and setting poles, 30–6	140	8.00	6.00	5.70	6.90	5.00	6.53	5.00
Furnishing and setting poles, 35–6	10	12.00	8.50	8.25	7.30	7.00	10.00	9.00
Furnishing and setting anchors	60	4.00	3.00	3.00	5.20	10.75	3.60	3.00
Hanging arc lamps	4	7.50	5.00	6.00	5.00	25.00	7.20	5.00
Hanging series Tungsten lamps	20	1.50	1.50	1.00	2.50	20.00	3.00	3.00
Hanging transformers	6	3.00	3.00	2.05	3.10	55.00	5.00	5.00
Furnishing and stringing No. 6 wire	1,600	.18	.18	.18	Cost + 10%	.17	.28	.19
Furnishing and stringing No. 8 wire	2,600	.19	.18	.18	Cost + 10%	.17	.30	.19
Power house		2,023.00	2,494.00	2,500.33	Lump sum	2,453.00	2,890.00	3,000.00
Well complete		1,300.00	1,850.00	1,579.10	Lump sum	2,229.00	2,695.00	2,000.00
Each foot over 30 ft. deep for well		40.00	100.00	40.00	38.00	40.00	90.00	140.00
Pole line lightning arresters	6	6.00	5.00	4.40	2.00	5.00	6.00	3.00
Concrete	40	7.00	7.00	6.40	11.00	7.00	8.40	7.00
Boilers, heaters, etc		3,600.00	3,796.00	3,046.00	Lump sum	3,181.00	3,400.00	3,300.00
Erecting and connecting machinery		300.00	200.00	360.00	Lump sum	100.00	600.00	400.00
Totals		$12,586.00	$13,126.12	$12,284.55	a $28,600.00	a $27,679.66	b $15,203.72	$13,285.04

a For all material and complete construction. *b* Extra for suction pipe for pumps.

TOWER AND TANK

Chicago Bridge and Iron Works, Chicago, Ill	$3,540.00	Des Moines Bridge and Iron Co., Des Moines, Ia	$3,610.00
El Paso Bridge and Iron Works, El Paso, Texas	3,793.00	Penn Bridge Co., Dallas, Texas	2,950.00
Kennicott Water Softener Co., Chicago, Ill	3,375.00	Casey Hedges Co., Chattanooga, Tenn	3,075.00
Minneapolis Steel and Machinery Co., Minneapolis, Minn	3,324.00	*Chas. A. Tappan, Oklahoma City, Okla	2,794.50

HYDRANTS AND VALVES

	Hydrants	Valves			Seventeen Valve Boxes	Totals
	Twenty 4"	Ten 4"	Four 6"	Three 2½"		
Ludlow Valve Co., Kansas City, Mo	$25.75	$7.90	$13.90	$4.80	$3.60	$663.00
Western Valve Co., Kansas City, Mo	25.75	6.90	10.25	3.97	3.13	675.87
Kennedy Valve Co., Kansas City, Mo	23.20	5.40	9.60	3.60	3.40	620.00
English Tool Supply Co., Kansas City, Mo.	25.50	7.25	11.50	4.25	3.00	665.00
*Bourbon C. & B. Works, Cincinnati, O	23.75	7.00	1.00	4.00	3.00	600.00

FURNISHING CAST-IRON PIPE

	9,444 ft. 4-inch C.-I. Pipe	3,336 Ft. 6-inch C.-I. Pipe	9,000 B. & S. Castings	Totals
*American C. I. Pipe Co., Kansas City, Mo	$30.15	$29.00	$0.03	$4,953.88
U. S. C. I. Pipe Co., St. Louis, Mo	30.25	29.25	.03	4,977.75

TWO 300-GALLON STEAM PUMPS

Worthington Pump Co., Kansas City, Mo.	$1,558.00
Deane Steam Pump Co., Kansas City, Mo.	1,872.00
Deane Steam Pump Co., Kansas City, Mo.	1,610.00
*Platt Iron Works, Dayton, Ohio	1,545.00

ARC LIGHTS AND SWITCHBOARD

*Wesco Supply Co., St. Louis, Mo	$2,567.00
Western Electric Co., Kansas City, Mo	2,618.69
United Electric Co., Wichita, Kan	2,579.20
Westinghouse Electric Co., Dallas, Texas	2,610.00
B. R. Electric Co., Kansas City, Mo.	2,701.75

HIGH SPEED ENGINE

Kansas City Eng. Co., Kansas City, Mo.	$1,078.00
English Iron Works, Kansas City, Mo	1,125.00
Chuse Eng. Mfg. Co., Mattoon, Ill	1,212.00
*Skinner Engine Co., Erie, Pa	1,250.00
Chas. A. Tappan, Oklahoma City, Okla	1,025.00

for the manufacture of gas for heating and cooking purposes.

Indianapolis, Ind.—The Trustees of the Indiana School for Girls will receive bids after June 1 for construction of an addition and improving the power plant and for lighting the grounds.

South Bend, Ind.—The Board of Public Works has ordered 40 incandescent lights placed along the river front in Leeper Park under supervision of City Engineer.

Westville, Ind.—Town Trustees have granted the Laporte Electric Co. a franchise to furnish electricity to Westville for light, heat and power purposes; proposed transmission line will be by way of Pinola and Pinhook; distance, about 12 miles.—J. H. Harding, Manager.

Lawrence, Kan.—Albert Emanuel and W. B. Sullivan, Dayton, are interested in the installation of an electric light plant.

Leavenworth, Kan.—The Tumwater Light & Water Co. will build a power line to Peshastin for pumping purposes.

Baltimore, Md.—S. Davies Warfield, Chairman of the Board of Directors of the Consolidated Gas & Electric Co., has outlined plans for financing the proposed natural gas pipe line; pipe line from the gas fields to this city will be constructed by a separate company; pipe line company will bear the name of the Seaboard Gas Co. and will be financed by private enterprise; new company will be required to lay 460 miles of 20-in. pipe from West Virginia to Baltimore in two lines of 230 miles each; this pipe line runs from the pumping station, which, at the commencement of the enterprise, will require 25,000 h.p.; this pumping station is connected with the wells by the field pipe lines of an average length of 70 miles; line will have a capacity to deliver from 70,000,000 to 80,000,000 cu. ft. daily; it will be the largest pipe line ever attempted and will cross mountain ranges 3,000 to 5,000 ft. above sea level, involving difficult engineering work and most expensive construction; to carry out these plans from $12,000,000 to $15,000,000 will be expended; an expenditure of from $1,000,000 to $2,000,000 will be necessary in the city and suburbs on the part of the Consolidated Gas, Electric Light & Power Co. to enable that company to serve its consumers; this will be largely for additions to the plant and service pipe.

Evering, Mass.—The Public Lighting Committee of the State Legislature has reported bill to establish the electric light district of this town.

Fairhaven, Mass.—Citizens are urging that a local lighting plant be established or better service secured from the New Bedford Company.

Fall River, Mass.—Manager Kimball, of the electric lighting company, has announced that the company proposes to replace the present electric light poles with new ones, having a concrete base, to prevent rotting.

Fitchburg, Mass.—Though the sewer question has been dropped for this year, city will have to take some definite action in the near future looking to the construction of a trunk sewer in order to satisfy the State Board of Health.

Orange, Mass.—The Orange Electric Light Co. will improve its plant, including construction of dam and power house.—A. W. Hubbard, Manager.

Worcester, Mass.—The Connecticut River Power Transmission Company filed with the Board of Aldermen a petition for a franchise to locate poles and string wires in Mountain and Burncoat sts. to a substation from which it intends to distribute electric power to the city's manufacturing concerns.

Kansas City, Mo.—The People's Ice Co. will rebuild power house recently destroyed by fire with a loss of $100,000.—A. J. Fenney, Manager.

Whitefish, Mont.—The Big Bend Light & Power Co. has been formed with a capital of $300,000 to construct and operate hydro-electric power plants in the States of Washington and Montana; E. Messinger is interested.

Cambridge, Neb.—Fire has destroyed the electric light plant, with a loss of from $20,000 to $25,000.

Hawthorne, Nev.—A. J. McCone, of Reno; J. E. Adams and John Miller, of Lucky Boy; H. M. Gorman, of Los Angeles; C. F. Collins, of St. Louis; Mitchell Fairfield and T. L. Oddie, of Tonopah, have formed a company to supply electrical power for Aurora, Lucky Boy, Hawthorne, Masonic and Bodie, and have secured the control of a chain of lakes in Mono County, Cal., emptying into Rush Creek, which water will be used in developing power.

Clarksboro, N. J.—City is to have a gas plant; a company has been formed and 90 per cent. of the inhabitants have agreed to become consumers at once.

Portales, N. M.—Citizens have voted $75,000 bonds for light, water and sewer systems.

Gouverneur, N. Y.—The contract for lighting the High School Bldg. will be let within the next few weeks; the Hannawa Power Co. has signified its intention of bidding for the contract; it also desires to enter the field for lighting the village and will shortly make a bid for the business.

Jamestown, N. Y.—The Village Trustees are considering installation of a municipal heating system in connection with its lighting plant; H. J. Babcock, Lockport, has estimated cost at $65,000 for the business section, or a total of $132,000 for the business and central residential sections.

Troy, N. Y.—A petition will be presented to the Council by the Troy Gas Co. asking permission to extend the company's conduits on River st., from Jay st. to Ingalls ave., and over Ingalls ave. to 7th ave.; cost of the improvement will be from $12,000 to $15,000, about 2,500 ft. of conduits being necessary.

Grand Forks, N. D.—The Light Committee of Council and Commercial Club are considering question of installing a new lighting system on the town streets; a system of side lights, four to each block, is favored.

Antwerp, O.—A. A. Pointer will install a 75-k.w., 3-phase, 60-cycle alternator; also a 150-h.p. boiler, 125-h.p. engine, 100-k.w., 3-phase generator, in light plant.

Columbus, O.—The Ohio Fuel Supply Co. will construct an 18-in. pipe line from Sugar Grove, O., to West Virginia gas fields; cost, $1,000,000.

Columbus, O.—Plans and specifications are being prepared by Harold M. Bush for additions to the power plant of the Girls' Industrial School; cost, $49,000.

Columbus, O.—The Trustees of the Sinking Fund have awarded $15,000 electric light extension bonds to the Union Savings Bank & Trust Co., Cincinnati, at a premium of $324.75.

Niles, O.—Council has granted a 20-year franchise to the Hydro-Electric Company, of Warren, to furnish municipal plant with electric light and power.

Idabel, Okla.—The Idabel Light & Power Co. has been incorporated with $10,000 capital stock by H. C. Morris, Charles Smith, W. B. Hinton, all of Idabel, and E. B. Herndon, Millerton, Okla., and others.

Oklahoma City, Okla.—The Oklahoma Gas & Electric Co. will expend $610,000 in improvements to electric and gas system; betterments include installation of 3,000-h.p. generator and $20,000 switchboard in power house, extension of electric light wires, laying of 40 miles of additional gas mains, making total of 109 miles.—A. H. Huey, Chicago, Vice-President.

Scranton, Pa.—Lackawanna ave. business men have joined in a movement to install ornamental lamp standards, each having three or four globes in clusters, on both sides of the avenue, from the bridge to new railroad station.

Spartanburg, S. C.—City has granted the South Power Co. a franchise to construct and maintain lines for the transmission of electricity.

Sumter, S. C.—J. E. Salley, Electrician, Orangeburg, has estimated cost of installing a street lighting plant of 100 lights at $13,526, and $66.14 annual cost per light for operation.

Sumter, S. C.—W. E. Brunson will probably expend $20,000 for property and machinery, etc., for development of water power.

Bristol, Tenn.—The Bristol Gas & Electric Co. will install steam turbine with capacity of 1,500 h.p. and gasholder.

Brownwood, Tex.—George W. Stone, Cleveland, O., has asked Council for a gas franchise; he proposes to install a gas plant.

Port Norfolk, Va.—The Portsmouth Gas Co., Portsmouth, will extend mains to Port Norfolk.—R. C. Marshall, President.

Rosslyn, Va.—Alexandria County citizens are discussing the formation of a gas and electric lighting company; Chairman D. S. Mackall will appoint a committee of twelve to provide for incorporation and to take any necessary steps in the interest of the organization; two sources of water power are available, one on Four-Mile Run, near Barcroft, which might be made useful in furnishing power; proposals have been made by two companies on the District side to furnish lighting and power current, and unless the company is formed these proposals will be accepted; no new poles or right of way would be needed at once, as the telephone poles could be used; if found advisable the new company could simply make a contract for current from some plant already in operation. D. S. Mackall, E. D. Johnson, M. E. Church, Ben Mackall, Frank Eastman, T. J. King, A. D. Torreyson, W. S. Hoge, Jr.; S. P. Wright, George H. Rucker, Frank Lyon, A. H. Barber and Dr. J. B. Gould are interested.

Winchester, Va.—The Interstate Natural Gas Co., chartered under the laws of West Virginia, will make application for a franchise at the next meeting of Council to do a general business in this city; the company owns a large number of gas wells in West Virginia and already pipe lines are being laid in a large portion of that State; company has made application for franchises in Baltimore and Washington and a number of towns in Maryland.

Bellingham, Wash.—The U. S. Government has granted the Skagit Power Co. a 50-year franchise and will erect a 60,000-h.p. plant in the reserve on the Skagit River.

Fayetteville, W. Va.—R. H. Dickinson has applied for franchise to construct and operate electric light system.—W. L. Lee, Mayor.

Kamloops, B. C., Can.—Citizens have voted to install an electric light plant.

BIDS RECEIVED AND CONTRACTS AWARDED

Waterbury, Conn.—Antonio Lambo & Co., of this city, has been awarded the contract for the laying of the main line of the extension to the mains of the Meriden Gas Light Co. from Meriden to Southington.

Washington, D. C.—Commissioner Macfarland has approved Electrical Engineer W. C. Allen's recommendation that three-year contracts be made with the Potomac Electric Power Co. The recommendation is as follows:

"First—That a three-year contract, beginning July 1, 1909, be entered into with the Potomac Electric Power Co. for furnishing and maintaining electric arc lamps in accordance with the specifications of the existing contract at the rate of $85 per lamp per annum.

"Second—That the proposal of the Potomac Electric Power Co. to furnish and maintain four-glower Nernst lamps on the Connecticut ave. bridge at the rate of $65 per lamp per annum be accepted for a period of three years beginning July 1, 1909, said service to be a part of the contract for incandescent electric lighting recommended below.

"The company has made a very favorable proposition in regard to the incandescent electric service, which, if accepted, will result in a material increase in the lighting as well as the substantial decrease in the annual cost to the District.

"In brief, the proposition is as follows:

"To change each of the present 25-c.p. lamps to a lamp giving from 35 to 40 c.p., the price to remain at $20.

"To continue to maintain the present 40-c.p. lamps, reducing the price from $24 to $20.

"To continue to maintain the present 75-c.p. lamps (in some cases increasing the c.p. to 80), reducing the price from $41.25 to $30.

"To reduce the price of 100-c.p. lamps from $50 to $35.

"To furnish lamps of from 55 to 60 c.p. and from 195 to 200 c.p. at the prices named, no such lamps now being in service.

"Third—That a three-year contract, beginning July 1, 1909, be entered into with the Potomac Electric Power Co. for furnishing and maintaining incandescent electric lamps in accordance with the specifications of the present contract at the rates named in the accompanying proposal.

"Fourth—That the company's proposal to furnish and maintain street designation lamps at $12.50 per lamp per year be also accepted for a period of three years, beginning July 1, 1909, to be made a part of the above mentioned contract for incandescent electric lighting."

Buffalo, N. Y.—The work of replacing the present gas lighting system at City Hall by electricity will begin in a few days, as the Trustees of the Hall have awarded the different portions of the work to the following bidders: McCarthy Bros. & Ford, wiring, $23,280; Allis-Chalmers Co., generators, $3,650; Skinner Engine Co., engines, $4,935; Charles Gruber, carpentry and masonry, $350; Alvin W. Day, tiling, $984; Joseph A. Goatsey, painting, $115; Timothy McEvoy & Son, steam fitting, $1,465.—Superintendent William F. Fisher.

New York, N. Y.—The following bids were received May 17 by C. B. J. Snyder, Superintendent of School Buildings, Department of Education, for installing electric equipment in new Public School No. 164 on the easterly side of 14th ave., between 42d and 43d sts., Borough of Brooklyn: Cowden & De Young, 45 East 42d st., New York, $10,239; J. H. Loweth, $10,330; W. A. Bogart, $11,680; T. F. Jackson, 592 Columbus Ave., New York, $10,700; Commercial Construction Co., 114 East 28th st., New York, $11,623; Peter & Powers, $10,772; E. J. Duggan, Queensboro Bldg., New York, $10,920.

Wilkes-Barre, Pa.—The Joint Street Lighting Committee has reported to Councils that they had advertised for proposals for lighting the streets and lanes of the city and had received two proposals, one of the Wilkes-Barre Gas & Electric Co., the other from James Bingham Ford; the lat-

ter assured the Committee that a company to be known as the "People's Electric Light Co. of Wilkes-Barre" would be organized on or about August 1 this year, and that the said company would agree to furnish the city with street lighting for a period of twenty years at a cost of not more than $50 per lamp per annum. This proposal, the Committee says, was rejected because it fails to comply with the requirements of the specifications; proposal of the local light company was as follows: $59 per lamp per year, for a period of three years; $57 per lamp for a period of five years; $54 per lamp for a period of seven years; accompanying the proposal was a certified check for $5,000; Committee further reported that they were unable to agree upon the term of contract to be awarded and asked that Council take action.

Madison, S. D.—Contract for furnishing a producer gas outfit was awarded to the Minneapolis Steel & Machinery Co., of Minneapolis, for $16,000, to include one 110- and one 225-h.p. engine and producer; contract for 50- and 150-k.w. generator and switchboard, to the Fort Wayne Electric Co., for $3,660.—Wm. Rae, City Auditor.

Sisseton, S. D.—The Minneapolis Steel & Machinery Co., Minneapolis, has been awarded contract for a 125-h.p. Muenzel producer gas engine and gas producer plant from the Sisseton Mill & Light Co., Sisseton, S. D. This engine will run both the flour mill and electric light plant and will be in service 24 hours a day.

Byers, Tex.—A contract has been closed between the Texas Co. of Houston, and the Byers Gas Light and Fuel Co., whereby Byers will be supplied with gas from the local fields for light, domestic and manufacturing purposes. Construction material has been ordered and the laying of pipe will commence at once.

Gonzales, Tex.—The Gonzales Electric Light & Power Co. has contracted with Westinghouse Electric & Manufacturing Co., Pittsburg, Pa., for 350-k.w. generator to develop about 460 horsepower; will furnish power for cotton mill and other local industries.

Tacoma, Wash.—City Electrician Lauzon has been authorized to enter into contracts with consumers of electricity to furnish them current at 2½ cents per kilowatt for heating and lighting purposes.

FIRE EQUIPMENT

Birmingham, Ala.—Alderman Gambill introduced a resolution providing for the purchase of a motor fire engine for the new Fountain Heights station; it was referred to the Fire Committee and Chief Bennett.

Ensley, Ala.—Citizens have voted $175,000 bonds for increasing Fire Department and for various improvements.

San Francisco, Cal.—The City Engineer is considering several systems of wireless telephoning to be used in connection with the water supply system for fire protection.

Canton, Ill.—Council has instructed the Fire and Water Committee to purchase 500 ft. of hose.

Sterling, Ill.—City will erect and equip a new station; a chemical engine will be purchased.

Topeka, Kan.—Fire Chief Welmarth has asked Council for a first size Ahrens engine.

Attleboro, Mass.—Town has voted to build a central fire station on South Main st. at a cost of $38,000.

Boston, Mass.—The Board of Aldermen has overriden Mayor Hibbard's veto on $15,000 loan for a fire station in Brighton.

Brookfield, Mass.—Chief Delancy will ask voters to appropriate sufficient money for the purchase of a truck.

Cliftondale, Mass.—Citizens are considering better fire protection, including the installation of an engine on Central st.

Lawrence, Mass.—Chief James Hamilton has recommended the installation of a fire alarm system, favoring the whistle signal in preference to a bell.

Melrose, Mass.—Citizens will vote June 8 on the referendum relating to the building of a $17,000 fire station at Melrose Highlands.

Southbridge, Mass.—Chief Dellater has asked town for more hose and hydrants.

South Hadley, Mass.—District will vote on the purchase of land in South Hadley and Granby for a fire house.

Turners Falls, Mass.—District has voted $350 for 700 ft. of hose.

Concord, N. H.—City has a fund available for the purchase of a steam fire engine.

Bayonne, N. J.—Alfred Davis, Chief Fire Department, has recommended the purchase of an automobile equipped with two 35-gal. chemical tanks to be stationed at fire headquarters; also 2,000 ft. of hose and a life net.

Collingswood, N. J.—Mayor Collings has recommended that Council purchase a steamer for fire protection.

Kearny, N. J.—Council will soon advertise for bids for a chemical wagon for the Highland Hose Company.

Paterson, N. J.—Architect W. T. Fanning has prepared plans for a two-story, $15,000 engine house.

Brooklyn, N. Y.—Architect Alexander Stevens, New York City, has prepared plans for two three-story fire engine houses; cost $28,000 each.—Nicholas J. Hayes, Commissioner.

Castleton, N. Y.—Architect Owen Finch, Schenectady, has prepared plans for a two-story engine house for the Wheeler Hose Company.

Drayton, N. D.—The Drayton Fire Company is considering the purchase of chemical fire engine.

Columbus, O.—The Trustees of the Sinking Fund have awarded the $8,000 for engine house equipment bonds to C. C. Dennison & Co., Cleveland, at a premium of $242.50; the Union Savings Bank & Trust Co., Cincinnati, was awarded the $25,000 engine house bonds at a premium of $739.

Gilboa, O.—City is considering the purchase of fire apparatus.

Lima, O.—Council has passed an ordinance providing a $5,500 bond issue for the purcha e of an aerial truck for the Fire Department.

Madisonville, O.—The Board of Safety will erect a two-story $8,000 engine house.—Samuel Hannaford & Sons, Cincinnati, Architects.

Portland, Ore.—Council has recommended to Committee on Ways and Means the immediate sale of $275,000 bonds for the purpose of purchasing a steel fire boat and reinforcing the mains along the water front.

Oil City, Pa.—City Controller has been authorized to advertise for bids on 500 ft. of 2½-in. hose; also to correspond with makers of automobile hose carts and fire trucks, procure prices and endeavor to bring a public demonstration of their merits.

Philadelphia, Pa.—The Frankford Business Men and Taxpayers' Association will urge the erection of a modern fire, police and patrol station at Frankford ave. and Margaret st.

Sanatoga, Pa.—The fire company at Sanatoga, a village near Pottstown, has purchased a lot on which to erect a fire house.

Sumter, S. C.—The Fire Department Committee has reported the need of 1,200 ft. of hose and recommended the purchase of that amount at 85c. per ft.

Ashland, Va.—City will erect two-story brick engine house.

Portsmouth, Va.—Fire Chief Murden and Councilman John Hall, Jr., are urging the necessity of providing fire hose for the department at once.

Tacoma, Wash.—Council has ordered Commissioner H. J. McGregor to plan a $2,500 concrete building for housing the fire alarm system.

Wartsburg, Wash.—Town has organized a Fire Department; apparatus will be purchased.

BIDS RECEIVED AND CONTRACTS AWARDED

Woodland, Cal.—A representative of the L. E. Boyle Co. has offered to take the old engine and hose wagon off the hands of the city at a price that was satisfactory to the Trustees and substitute a combination chemical and hose wagon; the change can be made at an expense of $200 to $300 and would greatly increase the efficiency of the Fire Department; the contract was drawn up and signed and the delivery will be made in 60 days.

New Bedford, Mass.—The Fire Committee considered proposals for apparatus to replace horses. Bids were invited on a chassis of at least 22 horsepower of the runabout type, which it is proposed to use as a motor car for the Master Mechanic of the Department Daniel D. Briggs. The cheapest proposition offered and what looked to be the best for the purposes was submitted by the Crown Motor Car Co., of Boston. This firm offered to sell to the Fire Department the Winton runabout which is now being used by the Water Department, and was bought by the city two years ago. The Water Board has ordered a new and larger car that will ride easier over the country roads, and the old machine is to be taken in trade. The committee voted to give the Chief authority to purchase the car at the best price possible if it is satisfactory to the Chief and the mechanics of the Fire Department, who will have a look at it. If this car is taken it can be taken by the Department in two weeks or sooner. There were numerous other proposals. W. L. Sturtevant offered a Ford, model T, 1909, for $850, but if ordered delivery could not be made before August 15.

A. L. Braley offered a Reo car for $1,000 and $35 additional for the same model car with different specifications.

The Auto Selling Supply Co. agreed to furnish a two-cylinder, model F, Buick, with a delivery wagon body, for $1,025. Mitchell runabouts, model J, were offered by Albert Rotch for $1,125 and $1,250, and model K for $1,507.50 and $1,675.

The S. C. Lowe Co. offered a 1907 Pope-Hartford runabout for $1,200; with box seat, $1,250; a Locomobile, type E, 1906, reconstructed, $1,300; Locomobile, type E, 1907, $2,000.

The Harry E. Borden Co. submitted a bid of $1,350 on a Maxwell, 20-24-h.p., two-cylinder, $1,350; and David L. Parker offered a model S, Pope-Hartford runabout for $2,750.

Chief Dahill read a proposition of the Robinson Fire Apparatus Co., of St. Louis, to furnish a pumping automobile fire engine, with a Thomas chassis, for $7,150, and several other communications bearing on pumping engines, including the Lut Wheeler, Pioneer and Webb. The Chief said that he had been looking up the matter of pumping engines, and he would want to know more about the construction before he recommended any. The metal used in the engine, the type of pumps and other factors, he said, he wished to know more about, and so the committee left the matter for further investigation.

Kalamazoo, Mich.—Bids for 1,000 ft. of fire hose were submitted by the Quinn Manufacturing Co. and the Wheeler-Blaney Co., of this city, the Larkin Manufacturing Co., of Dayton, O.; H. D. Edwards Co., of Detroit, and the United Supply Co., of Saginaw; the matter of purchase at the prices named, 68c. to 90c. per ft., was put over; 50 ft. of chemical hose was, however, ordered purchased.

Penacook, N. H.—The appropriation of $5,100, made at the May meeting of the city government for a new fire engine to replace the old Pioneer steamer at the local station, will be used for the purchase of a metropolitan fire engine, manufactured by the LaFrance Engine Co., of Elmira, N. Y.; company will allow a reasonable sum for the Pioneer, which was condemned some weeks ago.

Newark, N. J.—Bids for the Hollywood ave. fire house were opened and referred to the Fire Committee; according to the reading of the bids, the best offer made was in lump by the Sterling Engineering Co., of New York, which agreed to take the whole contract for $17,766, about $266 above the estimate of the architects, Hurd & Sutton, of this city. The highest figures exceeded $22,000.

Hazleton, Pa.—Councils in joint session opened five bids for a combination chemical fire engine as follows: T. Tray Co., Newark, N. J., combined chemical and hose wagon, horse-drawn, $1,798; firm would not bid on a 60-h.p. machine; La France Co., Elmira, horse-drawn chemical, $1,558; horse-drawn combination, $1,295; self-propelled, $5,500; Zanesville Chemical Engine Co., horse-drawn, $1,395; Webb Motor Fire Apparatus, Vincennes, Ind., automobile, $4.780; Robinson Fire Apparatus Co., St. Louis, by the Hazleton Machinery & Supply Co., horse-drawn chemical, $1,497.50; automobile, $5,000; all bids were referred to the Fire Committee.

Johnstown, Pa.—The purchase of a combination chemical and hose wagon, to be assigned to Engine Company No. 4, has been decided by the Board of Fire Commissioners; the wagon will be purchased from the A. T. Stewart Co., and the price will be $1,350. The wagon will have a 40-gallon tank and will be of a later design than the one now at the quarters of Engine Company No. 1.

Bids for hose were opened and a contract awarded the Eureka Co. at $1.10 a ft. The Commissioners have $2,000 to spend for hose.

Representatives of the Gamewell and Star Fire Alarm companies have been granted the privilege of demonstrating their systems in the office of the City Electrician on June 15. Ten boxes are to be added to the present system.

Providence, R. I.—Mitchell Nicholson, who was the lowest bidder for the contract to erect the new engine house for the Fire Department in the Maplewood district, has been awarded the work; it was necessary for the contractor, however, to reduce his figures, because of the lack of sufficient appropriation, and he will build the new station for $7,589, which is all the money available, and about $400 less than his original bid.

Tacoma, Wash.—Commissioner of Public Works H. J. McGregor has been authorized by the Council Fire and Water Committee to buy three street fire alarm signals from Kilbourne & Clark. If the three alarms prove satisfactory a fourth will be purchased. The alarms will cost about $135 each. It will cost about $90 each to install them and put them in proper working order. Chief McAlevy of the Fire Department recommended the purchase of the street alarms.

ELECTRIC RAILWAYS

Birmingham, Ala.—An ordinance has been presented to Council by Alderman Barnes Morgan providing for the grant of a franchise to the Birmingham & Edgewood Electric Company to erect a line from the southern terminus of the South Highlands line along the 20th st. road to the city limits; object of the new proposed car line is to connect city by rail with Shade's Valley.

San Francisco, Cal.—Petitions bearing the names of over 300 residents of the Sunset District have been filed with the Board of Supervisors asking that the 10th ave. extension of the Geary st. road be extended south of the Park by means of a subway.

San Mateo, Cal.—The City Trustees have received a petition from Captain Barneson requesting to be granted a franchise for an electric road which will traverse B st. south to 9th ave., thence west to Palm, south to 16th ave.

Atlanta, Ga.—The Georgia Railway and Electric Co. has petitioned for permission to extend its street car line on West Peachtree st. to Ponce de Leon ave.

Brunswick, Ga.—Construction will begin on the Brunswick Electric Street Railway very soon; application has been made to charter the road as the City & Suburban Railway of Brunswick; line to be about four miles long; capital, $50,000.—F. D. M. Strachan, F. D. Aiwen, E. F. Carey, C. Dunning, A. Fending, R. E. Briesenick and H. F. Dunwoody, of Brunswick, and George P. Walker, George F. Armstrong and H. G. Strachan, of Savannah, Promoters.

Rantoul, Ill.—Council has granted the Chicago, Kankakee & Champaign Electric Railroad, Kankakee, a franchise for an electric railway on Church st.

Newcastle, Ind.—The Union Trust Co., 116 East Market st., Indianapolis, receiver for the Indianapolis, Newcastle & Toledo Electric Railway Co., will receive new bids for completing, equipping and operating this railway between Indianapolis and Newcastle.

Lawrence, Kan.—Albert Emanuel and W. B. Sullivan, Dayton, are interested in the construction of a street railway line.

New Orleans, La.—The New Orleans Railway & Lighting Co. will build an extension of the Dauphine line.—Hugh McCloskey, President.

New Orleans, La.—The Directors of the New Orleans Railway and Light Co. have formulated a financial plan which involves the creation of a $50,000,000 bond issue; proceeds of the sale of these bonds will be devoted exclusively to extensions and betterments and for the purchase of new equipment, with the exception of a sufficient amount to take up $1,266,000 debenture notes outstanding.

Lawrence, Mass.—An expenditure of $120,000 will be made by the Boston & Northern Street Railway Co. in this city this year improving its tracks on Essex and Water sts. and equipping the power house with additional facilities; new rails on Essex st. will cost $40,000, new rails on Water st. will create an expense of $15,000, while the remainder of the $120,000 will be expended in purchasing a new boiler and generator for the power house.

Fulton, Mo.—City has granted the Mexico, Perry & Santa Fe Electric Railroad Co. a franchise to lay its tracks through certain streets.—S. L. Robinson, Promoter.

Sheffield, Mo.—The Blue Valley Traction Co. will build an electric railway from Sheffield, Kansas City, through Manchester and across the Blue River to Swope Park and Raytown.—M. M. Sweetman, President; C. W. German, Secretary.

Valentine, Neb.—W. K. Palmer, Engineer, Kansas City, will survey land for an interurban starting in this city and ending somewhere on the Dallas branch of the Northwestern.

Hampstead, N. H.—An electric line, which will be a continuation of the Manchester & Derry Road, will extend through this village and Atkinson; A. M. Emerson, Hampstead; H. W. Wheeler, Derry; W. H. Annis, Derry; Herbert N. Sawyer, Atkinson; George Sawyer, Atkinson; George P. Dow, Atkinson, and J. A. McGreal, Exeter, Promoters; charter was obtained four years ago; new line will be a direct way from Manchester and Derry to the beach.

Camden, N. J.—The South 5th St. Improvement Association is urging the installation of a trolley car system on South 5th st.

Albany, N. Y.—The Oneida Railway Co. has applied to the Public Service Commission for permission to extend its lines from Sherrill, Oneida County, to Kenwood, Madison County; extension is wholly within the town of Vernon in the city of Oneida, and is to provide transportation facilities for the employees of the Oneida Community, which has factories at Sherrill and Kenwood.

Dewitt, N. Y.—Town Board has granted the Syracuse Rapid Transit Railway a franchise to cross the thoroughfares between Eastwood and East Syracuse.

Lewiston, N. Y.—The Lewiston and Youngstown Railway Co. has asked permission of the village to construct and maintain a street surface railroad over Oneida st. from 5th to 8th sts.—F. S. Murph, Village Clerk.

Long Island City, N. Y.—The Queensboro Bridge and Jamaica Railroad Co. has a proposition before the Board of Estimate for a franchise across the bridge and from the Long Island City plaza to Jamaica; company will also apply for franchises for lines extending to all parts of the Second, Third and Fourth wards.

Troy, N. Y.—The Public Works Committee has taken favorable action upon the petition of residents of the Seventeenth Ward, asking that an ordinance be prepared, under which a franchise may be granted for a trolley line on 6th ave., North End.

Ardmore, Okla.—Citizens will next Tuesday night consider the proposition of Oscar Ayers, of Olathe, Kan., and Eastern financiers, to build a railroad from this point through the Arbuckle Mountains to Chickasha, and to establish here a 5,000-barrel capacity cement plant.

Enid, Okla.—Preliminary plans are being prepared by Engineer H. S. Moreland, Chamber of Commerce Bldg., for an electric railway from this city to El Reno for the Enid & El Reno Electric Railroad; distance 65 miles.

Guthrie, Okla.—The Garvin & Northwestern Railroad Co., of Garvin, which proposes to build two lines of railroad through McCurtain and Pushmataha counties, has been chartered with $100,000 capital stock; the first line is to run from Garvin northwest to Dexter, 55 miles, and the second from some accessible point on line No. 1, east to Eagletown, 25 miles; the average cost of the line is estimated at $7,000 per mile; the directors are E. E. Bushby, C. Gamble, G. A. Spaulding and William V. Engfer, of Garvin, and A. J. Waldock, of Oklahoma City.

Albany, Ore.—City has granted A. Welch a 40-year street car franchise.

Marshfield, Ore.—Coos County Commissioners have granted J. F. Clark and J. H. Sohmers a franchise for an electric railroad on county roads between Myrtle Point and Roseburg, or Coos Bay wagon road from Sumner to Myrtle Point; work must begin within six months.

Oregon City, Ore.—F. M. Swift is promoting the construction of an electric railway to Molalla, Scotts Mill and Marquam; property owners along the route have subscribed $100,000.

Allentown, Pa.—The Stockholders of the Lehigh Valley Transit Co. voted to spend practically $1,000,000 for improvements to the system, largely for a belt line in this city.

Bakersville, Pa.—The Somerset & Bakersville Railway Co. has been chartered to construct an electric railway from Rockwood to this city; distance nine miles.—Charles F. Hood, Connellsville, President.

Chester, Pa.—Citizens are becoming interested in the proposed trolley line between Chester and West Chester by the way of Concordville; Chester Board of Trade and the West Chester Business Men's Association are co-operating and new individuals have taken hold of the idea.

Harrisburg, Pa.—A charter has been granted to the California & The Centerville Street Railway Co. to construct a five-mile line in Washington County; capital, $30,000; directors and incorporators are M. H. Francies, president; W. J. Weaver, H. C. Dunn, Joseph McLain and Harris Booker, all of California.

Newville, Pa.—Town has granted the Cumberland Railway Co. a franchise for its proposed 12-mile electric railway from Carlisle through this place.

Scranton, Pa.—Lackawanna ave. business men will call upon General Manager Caum, of the Scranton Street Railway Co., and suggest to him that the double tracks which now extend up and down the avenue be moved further apart and a series of ornamental poles with mast arms placed on them, these arms extending out from the poles to either side, to carry wires for both tracks installed.

York, Pa.—The Highway Committee of City Councils has agreed to recommend ordinances releasing the company from two $25,000 bonds for the York Railways building of certain lines which it wishes to drop, upon condition that other lines are extended into territory now lacking trolley facilities, and improvements are made to existing lines; under the franchises covered by the bonds the company would have expended about $80,000 for improvements; it offers to expend $100,000 for other improvements, if released; definite action has been deferred.

Westmoreland, Tenn.—The Westmoreland & Red Boiling Springs Railway has made application for a charter to build a railway from this city to Red Boiling Springs; capital stock, $5,000; A. R. Dean, H. C. Smith, E. K. Lamb, W. A. Smith and J. B. Kemp, Incorporators.

Dallas, Tex.—The Dallas Street Railway Co. will rebuild its tracks on East Elm st. from Walton st. to Carroll st.

Lynchburg, Va.—The People's Improvement Co. will build a line from Lynchburg to Fairview Heights; distance one mile.—R. J. Hughes, President.

Barre, Vt.—In spite of the protest of the Barre & Montpelier Traction Co., Council has ordered the railway to extend its lines on South Main st. and form a loop at Ayer st.; extension will cover Circle and Quarry sts.

Grafton, W. Va.—The Grafton Traction Co. has begun a survey for its extension on the west side.—F. M. Foust and J. E. Henshel, Connellsville, Pa., Engineers.

Hinton, W. Va.—The Hinton Street Car & Transportation Co. has been chartered to build a line from this city via Union, Avis and Red Sulphur Springs to connect with the Norfolk & Western Railway and the Virginian Railway at the mouth of East River, in Mercer County, West Virginia; capital, $50,000.—James T. McCreery, W. H. Sawyer, H. Ewart, O. O. Cooper and J. H. Miller, Incorporators.

Buckingham, Que., Can.—Plans are being prepared for the extension of an electric car line between Masson and this city.

New Hamburg, Ont., Can.—The Metropolitan Railway Co. will construct a railway which will extend from Stratford to Guelph.

BIDS RECEIVED AND CONTRACTS AWARDED

Wheaton, Ill.—The Chicago, Wheaton & Western Railway has awarded contract to W. C. Carrington, Gary, Ind., for constructing that section of the proposed electric railway from Wheaton to Geneva.—Henry C. Wood, President, 707 Rookery Bldg., Chicago.

Watertown, S. D.—E. Stanley, E. E. Simpson and C. E. Edwards and capitalists from Des Moines, Ia., have let to the Chicago Engineering, Construction & Security Co. a contract to build an electric line between Watertown and Lake Kampeska. The road must be ready by July 1. The company will have cash capital of $50,000. A deal for a heavy car has already been made, and E. E. Simpson left for Des Moines and other eastern points to purchase two more.

BRIDGES

Little Rock, Ark.—The St. Louis, Iron Mountain & Southern Railway and Chicago, Rock Island & Pacific Railway have had surveys made for steel viaduct to be constructed across tracks near Little Rock.

Prescott, Ark.—County Judge A. M. Denham is considering construction of concrete bridge across Garland Creek.

Washington, D. C.—Congress will appropriate $85,000 for completion of concrete bridge over Piney Branch at extension of 16th st.; bids will soon be opened.—Henry B. F. Macfarland, Commissioner, D. C.

Tampa, Fla.—Citizens have defeated proposition to issue $480,000 bonds for the construction of proposed Lafayette st. bridge, city hall and hospital, additional paving and sewerage.

Armstrong, Ill.—Citizens have voted to erect a bridge over the Middle Fork River.

Havana, Ill.—Council has appropriated $1,250 for bridge improvements.

Quincy, Ill.—Melrose Township Highway Commissioners have decided to ask for bids for constructing a bridge over Mill Creek, known as Wagner's Creek.

Columbus, Ind.—County Engineer W. H. Wright is preparing plans for three reinforced concrete bridges to be constructed in Bartholomew county.—J. M. Davis, County Auditor.

Cascade, Ia.—County Supervisors have decided to construct a concrete bridge across the Maquoketa River; structure will have 16-ft. driveway and will cost $5,400.

Lone Tree, Ia.—Bridge will be constructed over Iowa River this year.

Kensington, Md.—Town Council has decided to construct a new bridge on the Capital View rd.

Boston, Mass.—On motion of Senator Shaw of Manchester, all the rules were suspended and the Parker River bridge bill, to cost $120,000, was given its several readings, engrossed and sent to the house.

Worcester, Mass.—The Ways and Means Committee has reported bill to investigate the bridge and roadway over Lake Quinsigamond.

Duluth, Minn.—Third st. residents are circulating a petition for the construction of a concrete bridge over Oregon Creek.

Laconia, N. H.—Council has instructed the Board of Public Works to repair the present wooden bridge on Church st. over the Winnipiseogee River, at an expense not to exceed $1,300.

Flemington, N. J.—Hunterdon County Freeholders will build a concrete bridge over Frog Hollow Creek to replace the present one.

Buffalo, N. Y.—Governor Hughes has signed the bill appropriating $19,500 toward constructing a steel bridge over the Erie Canal at Georgia st.

West Seneca, N. Y.—Taxpayers have defeated the proposition to build three new bridges.

West Seneca, N. Y.—Town Board nas voted $500 for the repairing of the bridge on Union road over the Cazenovia into Lein's Park.

Lima, O.—The City Engineer has submitted estimates for the construction of the proposed Shawnee bridge, rating a concrete bridge, together with the necessary straightening of the creek channel at that point, at $13,400, or a steel structure at a cost of $11,400.

Pond Creek, Okla.—The Chicago, Rock Island & Pacific Railway Co., during the present summer, will begin the construction of a big railway bridge across the Salt Fork River; the bridge is to cost $25,000.

Altoona, Pa.—Superintendent of Highways Shimer has reported that repairs were needed to the 7th st. bridge and estimated cost at $2,000.

Chester, Pa.—Plans have been prepared for the erection of a fine stone bridge across Ridley Creek in Chester Park, in place of the rustic wooden affair which has provided the crossing for years; President Frederick A. Howard, of the Park Commission, has estimated the probable cost at $4,500.

Johnstown, Pa.—The proposed construction of a highway, connecting the two roads which run from the Puritan school house and eventually reach the Franks-town road, will necessitate the construction of a short bridge over Trout run and a tile culvert over a spring run.

York, Pa.—The Highway Committee has decided to advertise for bids for the erection of bridges at Kouse ave. and King st.

Washington, Pa.—The Grand Jury approved the construction of a bridge over Cross Creek near Wilson's Mill, which joins Hopewell and Cross Creek townships; cost $4,796.—J. B. Wilson is interested.

Pawtucket, R. I.—General Assembly has passed a bill providing for the appointment of a commission to have charge of constructing a bridge over Blackstone River between Pawtucket and Central Falls.

Cameron, Tex.—The Commissioners' Court of Milam County has visited the crossing on Little River, known as Bryant Station, with the purpose of inspecting a site to erect a bridge as soon as the county's financial condition will permit.

Hearne, Tex.—County Commissioners are considering erection of a bridge over the Brazos River near this city.

Memphis, Tex.—The Altus, Roswell & El Paso Railway will construct a bridge in connection with railroad construction work across Stump Creek.

Dayton, Wash.—The O. R. & N. Railway will erect a double steel bridge across the Touchet River in South Dayton.

Olympia, Wash.—The County Surveyor has been instructed to draw plans and specifications for a bridge over the Payne-Bott rd.

Tacoma, Wash.—The South End Improvement Club will ask Council to erect a new bridge at Wapato on 56th st.; present bridge is too narrow.

Bluefield, W. Va.—Norfolk & Western Railway will build third bridge over tracks in East Bluefield.—C. S. Churchill, Roanoke, Chief Engineer.

Edmonton, Alta, Can.—The Department of Public Works has plans for 429 bridges to be built this year.—W. H. Cushing, Minister Public Works.

BIDS RECEIVED AND CONTRACTS AWARDED

Bay City, Cal.—The Atlantic, Gulf & Pacific Co., Monadnock Bldg., San Francisco, has been awarded contract for building a bridge across San Gabriel River. The bridge is to connect Bay City with Long Beach.

Santa Barbara, Cal.—The Union Iron Works, 20th and Michigan sts., San Francisco, has been awarded contract at $7,300 for constructing three bridges in road district of Monticello for the county.

Stockton, Cal.—The McGilvray Construction Co., San Francisco, Cal., has been awarded contract at $23,000, for constructing the Joint County steel bridge over Dry Creek.

South Windsor, Conn.—The Board of Selectmen has received bids as follows for the construction of a concrete-arch bridge across Scantic River: Curtis & Dean, Hartford, $9,712 and 50c. per ft. for piles; Sperry Engineering Co., New Haven, Conn., $9,300 and 40c.; F. B. and W. H. O'Neil, Hartford, $8,650 and 50c.; A. W. Byrne & Co., Hartford, $8,500 and 40c., with $7 per cu. yd. extra for concrete filling. The contract has not been awarded.—H. E. Pitkin, Chairman.

Washington, D. C.—Bids were received as follows by the Commissioners of the District of Columbia for widening a concrete bridge across Piney Branch on the line of 16th st. extended: Hopkins, Barnett & Co., Baltimore, $79,500; T. E. Riddle, Philadelphia, $79,600; Cranford Paving Co., Baltimore, $84,500; McCormick & Co., Philadelphia, $71,705; G. & W. Mfg. Co., 26 Cortlandt St., New York, $68,890; Baltimore Ferro-Concrete Co., Baltimore, $76,480; Penn Bridge Co., Washington, $79,375.

Chicago, Ill.—Contract for erecting bridge over Illinois and Michigan Canal at Skedzie ave. has been awarded to the Fitzsimons & Connell Co., Tacoma Bldg., Chicago, for $22,000; bids were opened May 12.

Decatur, Ill.—The Decatur Bridge Co. has secured contract, at $6,782, for constructing a bridge over Flat Branch Creek, ten miles northeast of Taylorville; structure is to be 685 ft. long and entirely of steel.

Morrison, Ill.—Contract has been awarded to Schmitt Construction Co., Peoria, at $1,656, and 55c. per lin. ft. for piling, for constructing 50 ft. long 16 ft. roadway, reinforced concrete bridge.

Peoria, Ill.—The contract for the foundation and piers for the proposed new Pekin & Peoria Union Railway bridge to be erected across the Illinois River at this point, has been awarded to the Yawger Co., of Indianapolis, and work will be begun at once. The contract price is understood to approximate $250,000. The substructure is to be completed by October 15.

Waterloo, Ia.—The Marshall Engineering Co., Des Moines, has been awarded contract for constructing a concrete and steel bridge over Crane Creek, near Dunkerton for the county.

Bar Harbor, Me.—The contract for rebuilding Duck Brook bridge of reinforced concrete has been awarded to Small & Ingalls at $8,300.—Edgar I. Lord, Engineer.

Milford, Mass.—The Board of Selectmen opened five bids for the erection of the new concrete bridge over the Wepowage River near the home of the late H. J. Bristol; the highest was that of Sibley & Co., of New Haven, who named $6,716 as the price; Geo. McAlbro, of New York City, wanted $6,500; B. N. Beard, of Shelton, $5,000; Elbert N. Clarke, $4,975, and Ryan & Unmack, of New Haven, $4,525. The Board decided to give the contract to Ryan & Unmack.

Newburyport, Mass.—Essex County will rebuild the chain bridge at Newburyport and Salisbury; plans for the alterations have been made and accepted and bids opened; the general appearance will not be changed, for the work which is to be done will be to strengthen the present structure; the County Commissioners did not award the contract, taking the bids under advisement; they were: C. F. Hall, Boston, $53,244 for steel, $56,884 for concrete; W. H. Ellis, Boston, $64,860 for steel, $69,109 for concrete; Snare & Trieste Co., New York, $53,300 for steel, $57,300 for concrete; Holbrook, Cabot & Rolling, Boston, $51,300 for steel, $55,600 for concrete; John A. Roberling & Sons, Boston, $56,725 for steel, $57,735 for concrete, with a counter proposition to rebuild from their own design of chains and trusses, $51,300 for steel and $55,600 for concrete.

Iron Mountain, Mich.—The Wisconsin Bridge Co. has been awarded contract, at $6,472, for constructing bridge across Sturgeon River, near New York Farm. The bridge is to be 160-ft. span riveted truss structure, with concrete floor.

Lincoln, Neb.—The County Commissioners have awarded the contract for the county bridge work during the year 1909 to the Standard Bridge Co., of Omaha, for about $30,000.

New York, N. Y.—The Fort Pitt Bridge Co., House Bldg., Pittsburg, has been awarded contract, at $25,000, for the East New York bridges, between New Lots road and Liberty ave. This is a part of the work connected with the removal of grade crossings along the Long Island railroad.

Syracuse, N. Y.—The W. J. Burns Co. of this city was awarded the contract, May 25, for the construction of a steel bridge over the New York Central tracks in the Seventh Ward for the Delaware, Lackawanna & Western Railroad Co.; cost, $50,000.

Devil's Lake, N. D.—The County Commissioners let contracts for six bridges, A. T. Bayne, of Minneapolis, being the successful bidder, with F. A. Dibley a close second; there was only $106 between these bidders on a $32,000 contract.

Canton, O.—The Kissinger Co., of Carrolton, was, May 20, awarded the contract for the construction of a concrete bridge across the river in West Tremont st., Massillon, by the County Commissioners; the bid was $13,139, and was the lowest by $700; the bridge will have two 60-ft. spans; eight bids were received; work is to be started within a month.

Cleveland, O.—Bids for the construction of the new bridge between E. 65th st. and Berwick road, S. E., were received May 20 by the Board of Public Service; the low bid was submitted by the H. J. Collier Co., at $16,707. The bridge will be of timber construction and will be 675 ft. long; throughout a length of 400 ft. it will be 80 ft. high. The bridge is to cross Kingsbury Run and will connect the Newburg section with Kinsman road; bids on the last Kinsman road Pennsylvania grade crossing contract were also received; the bridge over the tracks has been in use since fall, but a concrete stairway is yet to be built and cement sidewalks are to be laid; the low bid on this work was submitted by M. P. Platten, at $3,285.

Dayton, O.—The contract for the substructure of the Schuster bridge on 9th st., Miamisburg, was let to James Manuel by the County Commissioners; the successful bid calls for $4.45 per cu. yd. for concrete work.

Hamilton, O.—Contracts for bridge work, bids opened on May 8, have been awarded as follows: To Frank Bone, of Lebanon, O., for Reily Township bridge, $3,270; to the Capitol Construction Co., Columbus, O., for superstructure of Oxford bridge, at $5,185.—J. E. Brate, County Auditor.

West Carrolton, O.—The County Commissioners, Dayton, have awarded contract for constructing a lift bridge in West Carrolton to the Brookville Bridge Co., Brookville, Ind., at $8,723.

Endleton, Ore.—The Columbia Bridge Co., Walla Walla, Wash., has been awarded contract for constructing the steel bridge over the Umatilla River at Lee st.; the bridge is to have concrete abutments and piers; estimated cost, about $11,000.

Philadelphia, Pa.—The McClintic-Marshall Construction Co., of Pottstown, Pa., has been awarded contract to erect bridges and viaducts for the Philadelphia & Reading Ry. Co. in order to remove the 9th st. grade crossing between Spring Garden st. and Huntingdon st.; the contract amounts to $859,912.

Scranton, Pa.—The Bonn Quarry and Construction Co. has been awarded the job for the new culvert over Meadow Brook at Glen st. for $1,832.

Wilkes-Barre, Pa.—Horatio S. Moore, of Bellefonte, May 26, was awarded the contract for constructing a bridge in Hollenback Township; his bid of $2,400 was accepted by the County Commissioners.

Wilkes-Barre, Pa.—The County Commissioners have awarded contracts for the construction of twenty-two new bridges in various sections of the county; bids for twenty-seven new bridges and culverts were received, but in several instances the contract was not awarded, the Commissioners deciding to put off the matter until a later date; the contracts given total $11,350.80.

The successful bidders and the contracts they secured are as follows:

No. 1—Concrete bridge, Jackson Township, Jasper Swingle, Shavertown, $473.75.

No. 2—Stone arch bridge, Lake Township, Alwich Roushey, Shavertown, $523.50.

No. 3—Stone arch bridge, Lake Township, J. H. Hoover, Ruggles, $279.

No. 4—Steel and concrete bridge, Black Creek Township, George Dinkelacher, of Drums, $1,350.

No. 5—Steel and concrete bridge, Black Creek Township, Angelo Luckli, Conyngham, for $537.

No. 6—Stone arch bridge, Exeter Township, Millard Kintz, $348.

No. 7—Stone arch bridge, Wright Township, John F. Abend, Wilkes-Barre, $280.

No. 8—Steel and concrete bridge, Pittstown Township, Bown Quarries Co., Duryea, $760.05.

No. 9—Steel and concrete bridge, Fairmount Township, George Dinkelacher, Drums, $487.50.

No. 10—Stone arch bridge, Fairmount Township, W. H. Calkins, Shavertown, $389.50.

No. 11—Steel and concrete bridge, Hunlocks Township, contract not awarded.

No. 12—Stone and concrete bridge, Ross Township, Bown Quarries Co., Duryea, $400.

No. 13—Stone arch bridge, Hunlocks Township, contract not awarded.

No. 14—Stone arch bridge, Ross Township, Peter J. Clark, Wilkes-Barre, $600.

No. 15—Steel and concrete bridge, Butler Township, George Dinkelacher, Drums, $687.50.

No. 16—Pipe and concrete culvert, White Haven, T. W. Haines, Wilkes-Barre, $199.

No. 17—Arch bridge, Salem Township, Lewis Kishbaugh, Nescopeck, $425.

No. 18—Concrete arch bridge, Lehman Township, John Abend, Wilkes-Barre, $650.

No. 19—Steel and concrete bridge, Black

Creek Township, Lewis Kishbaugh, Nescopeck, $500.

No. 20—Concrete and iron bridge, Huntington Township, A. R. Good, Watertown, $494.

No. 21—Concrete and iron bridge, Union Township, Andrew Croop, Hunlocks, $793.

No. 22—Concrete culvert, Sugarloaf Township, no bids received.

No. 23—Stone arch bridge, Exeter Township, Millard Kintz, Pittston, $395.

No. 24—Steel bridge, Hollenback Township, contract not awarded.

No. 25—Steel girder bridge, Wright Township, contract not awarded.

No. 26—Reinforced concrete bridge, Dennison Township, no bids received.

No. 27—Steel and concrete bridge, Dorrance Township, W. A. Richards & Co., Wilkes-Barre, $779.

Mitchell, S. D.—The following bids were received, May 20, for building one 80-ft. steel bridge and three smaller pile bridges: Hennepin Bridge Co., Minneapolis, $3,490 for 80-ft.; Chas. E. Bealy, Leigh, Neb., $3,760 for all; Michael E. Cowan & Co., Tecumseh, Neb., $3,600 for all; F. L. Freeman, Tecumseh, Neb., $3,526 for all; Beach Mfg. Co., Sioux Falls, S. D., $3,352 for all; Central State Bridge Co., Minneapolis, Minn., $3,850 for all; Fred Bjodstrup, Mitchell, S. D., $3,297 for all. Contract was awarded to Fred Bjodstrup, work to be completed in 80 days.—H. B. Anderson, County Auditor.

Fairview, Tex.—The contract for constructing the Fairview bridge has been let to the El Paso Bridge Co., El Paso, at $17,400, to be completed by Nov. 6. The bridge will be a steel truss 450 ft. long with a pier in the middle. There were about ten companies which submitted bids.

Van Alstyne, Tex.—Grayson County Commissioners have awarded contract to M. S. Hasie, Jr., Bridge Co., Dallas, Tex., to construct 60-ft. steel bridge across Sister Grove Creek.

Rock Springs, Wyo.—The County Commissioners have accepted the bid of the Smith-James Lumber Co. for a bridge over Kilpacker Creek, north of Rock Springs, the same to be completed within thirty days. Chris Bunning was awarded the contract for grading and constructing something over a mile of roadway on the same highway and adjacent to Kilpacker Creek.

STREET CLEANING AND REFUSE DISPOSAL

Montgomery, Ala.—City will establish an incinerating plant for burning garbage.

Los Angeles, Cal.—Council is considering improvements in the present system of garbage disposal.

Topeka, Kan.—Council has instructed City Engineer to prepare an estimate of cost of constructing a municipal garbage plant.

Herkimer, N. Y.—The Village Board of Health will call for bids for the collection of garbage within the village limits at once.

Toledo, O.—Council has passed an ordinance empowering the city to borrow $10,000 for private street cleaning and sprinkling; this will provide the money necessary to clean some 23 streets in the city for the season.

Oklahoma City, Okla.—Citizens are considering the construction of a garbage disposal plant.

Portland, Ore.—City will expend $6,000 in improvements to the garbage crematory.

Portland, Ore.—Superintendent C. L. Dagget has recommended that the city garbage burner be repaired at a cost of $6,000.

Johnstown, Pa.—Councils have decided to request the Johnstown Passenger Railway Co. to place in use an electric sprinkler to distribute water on the various highways of the city traversed by the lines of the company.

Seattle, Wash.—The Green Lake Improvement Club will ask Council to build a garbage incinerator in the north end.

BIDS RECEIVED AND CONTRACTS AWARDED

Sioux City, Ia.—Council has decided to buy the St. Louis Sanitary Co. street flusher which Commissioner Ford recommended after inspecting its work at Omaha. It is to cost $1,040, and a man is to be sent here to put it in operation; another St. Louis flusher costs $900 and one at Cleveland $1,050, but the Street Commissioner has only seen one kind in operation and as it appears satisfactory Council bought it.

Dayton, O.—The contract for sprinkling High from Fifth to McLain was transferred from Fred Weishet to William Turner.

MISCELLANEOUS

Ensley, Ala.—Citizens have voted $175,000 bonds for jail, school and sewer improvements and for the increasing of the Fire Department.

Alameda, Cal.—Ex-Chief Conrad has asked that provision be made in the annual budget of the department for funds to be used in the purchase of a combined patrol wagon and ambulance.

Oakland, Cal.—Plans for the improvement of the marsh lands between Lake Merritt and the 8th st. bridge, now being filled by dredging from the lake, have been discussed by the Board of Public Works; City Engineer Turner has prepared a large blue print which outlines a boulevard system surrounding the whole park; Board will act in conjunction with the Park Commission before submitting the plans to the Council; it is planned to lay out the roads so that each will enter a boulevard surrounding the park; the road across the dam is to be improved and the trolley poles are to be placed in the center of the tracks and are to be surmounted with electroliers.

Redlands, Cal.—Citizens will vote, June 3, on $80,000 bonds for the purchase of a site and the erection of a municipal building.

San Francisco, Cal.—The Board of Public Works has passed a resolution recommending to the Board of Supervisors that a safety station be constructed at 3d and Market sts. and another at the junction of Haight, Market and Gough sts.

Milford, Conn.—General George Hare Ford, New Haven, will present to this town a fountain to be placed in the green opposite the Taylor Memorial Library.

New Britain, Conn.—City has awarded $368,000 4 per cent bonds, including $215,000 municipal building bonds, to Estabrook & Co., at $100.13.

Waterbury, Conn.—City is considering the purchase of a $5,000 auto patrol wagon.

Washington, D. C.—With the object of cutting down the expense of handling sand and gravel used by the District, a new wharf will be constructed by the local authorities on Water st. at the foot of 1 st. southwest; new dock is to be used by the District for the storage of sand and gravel; bids for the rebuilding of the old wharf now on the site and for the necessary dredging have been invited; about $3,500 will be expended for the work.

Tampa, Fla.—Citizens have defeated proposition to issue $480,000 bonds for the erection of a city hall and hospital and for other improvements.

Bainbridge, Ga.—Citizens will vote, June 8, on $15,000 of bonds for city hall.

Bloomington, Ill.—Plans are being prepared by Architect Geo. H. Miller for alteration to jail.

Hutchinson, Kan.—City is considering the improvement of Elmdale Park between D and E aves. and Elm and Plum sts.

Portland, Me.—The Finance Committee of Council was to have opened bids, May 28, for the Portland & Ogdensburg Railroad stock which the city owns, but there were no bids for it; if the stock is not disposed of the city cannot rebuild the city hall which was burned in 1907.

Boston, Mass.—The Board of Aldermen has sustained Mayor Hibbard's veto on three items in the recent loan bill of $989,500; vetoes sustained are: $80,000 for a Charlestown court house and police station; $65,000 for a South Boston court house, and $25,000 for a playground in Ward 12, a total of $170,000 cut from the loan bill; Mayor's veto on the three remaining items, amounting to $65,000, was overriden, $25,000 each for playgrounds in Wards 7 and 16, and $15,000 for a fire station in Brighton.

Haverhill, Mass.—Council agreed upon the purchase of the Swasey property on Blaisdell st. in Ward 5 for a public playground as voted at last election; it is planned to expend $3,000 in equipping the playground.

Newton, Mass.—The Board of Aldermen has appropriated $2,250 to buy a playground at Newton Upper Falls.

Minneapolis, Minn.—The Council Ways and Means Committee has recommended the request of the Park Board that the Council order the issuance of the $350,000 in bonds authorized by the last Legislature.

Leaksville, Miss.—Green County Supervisors have accepted the plans and specifications by Hull & Ewing, Jackson, Miss., for the erection of a jail.

Seminary, Miss.—Town Council has voted to purchase steel cells for city prison.

St. Louis, Mo.—The Board of Police Commissioners will erect a three-story police station; cost $33,998.

Hackensack, N. J.—Architect James Kiely Gordon has prepared plans for a $1,000,000 Court House and jail for Bergen County.

Newark, N. J.—Bids will be received June 2 for $440,000 4 per cent semi-annual hospital bonds.

Lockport, N. Y.—The Board of Health has asked that Council arrange for the purchase of a site and erection of a building where patients with contagious or infectious diseases may be confined.

New Brighton, S. I., N. Y.—The Mayor has approved ordinance providing for $7,500 bonds for preparation of plans and specifications for erection of refuse destructors, engineers' houses, stables, etc., in this borough.

New York, N. Y.—Bids will be received June 8 by Comptroller Metz for $3,200 bonds for the proposed rapid transit loop and $800,000 bonds for a public library.

New York, N. Y.—The Department of Bridges is preparing plans for two footwalk approaches and comfort stations; cost $50,000.—J. W. Stevenson, Commissioner.

Niagara Falls, N. Y.—An offer has been made by George W. Wallace, of Canandaigua, to Council of the plot of ground at 15th and 16th sts. and Weston and South aves., containing 57,600 sq. ft., to be used as a park and playground for the sum of $10,000.

College Hill, O.—Bids will be received until noon, June 21, for $4,000 park bonds. F. R. Strong, Village Clerk.

Columbus, O.—The Trustees of the Sinking Fund have awarded $40,000 public improvement bonds to Rudolph Kleybolte & Co., Cincinnati, at a premium of $520.

Oklahoma City, Okla.—The Park Board has adopted the Kansas City system of park building and park management; a landscape architect will now be secured to take charge of the work; $400,000 bonds are available.

Pineville, Ore.—City will at once start the erection of a City Hall.

Carbondale, Pa.—A movement has been started by Mayor Sahm to raise funds for a city ambulance; ambulance, if the required funds can be secured to purchase the same, will be located in the Hendick Hook and Ladder house on River st. and will be subject to all calls.

Franklin, Pa.—The Y. M. C. A. is urging the establishment of a public bath house along the water front of the city.

Johnstown, Pa.—The Committee on Police and Public Safety has reported favorably on ordinance authorizing purchase of an automobile for patrol service.

Philadelphia, Pa.—The Frankford Business Men and Taxpayers' Association will urge the erection of police patrol and fire station at Frankford ave and Margaret st.

Wilkes-Barre, Pa.—The Public Property Committee will visit Atlantic City, N. J., to get ideas for the proposed station house for this city.

Knoxville, Tenn.—Bids will be asked for the erection of a fountain in Emory Park near North Broadway, in a few days; the Board of Public Works will instruct Chairman John W. Flenniken to receive bids for this fountain; Council appropriated $500 for the erection in Emory Park.

Memphis, Tenn.—The $1,000,000 issue of park improvement bonds has been sold to Lawrence H. Parkhurst, of Boston, at a premium of $41,700 and accrued interest; bonds are to run for fifty years and bear 4 1-4 per cent. interest and will thus net the purchasers an interest of 4.09.

Aspermont, Tex.—Stonewall County will vote, June 10, on $5,000 bonds to repair jail.

Brady, Tex.—Commissioners' Court has ordered election July 10 on $12,000 bonds to build a jail.

Paris, Tex.—Assistant Attorney General J. D. Sluder has approved the $10,000 city hall bond issue.

Seattle, Wash.—The Board of Park Commissioners is considering the establishment of a central park near the King County Court House.—R. H. Thomson, City Engineer.

Oshkosh, Wis.—Architect H. Auler has prepared plans for a $3,500 patrol house.

Oak Bay, B. C., Can.—Council has appointed a committee consisting of Councillors Newton and Macgregor, and the engineer, to report upon the project of building a municipal wharf.

BIDS RECEIVED AND CONTRACTS AWARDED

Pasadena, Cal.—The Spalding Bros. Co., Chicopee, Mass., has contracted to furnish the playground apparatus for the public playground to be established at Colorado Street and Vernon Avenue, and shipped the full consignment by fast freight immediately on receiving the news that the contract was approved by Council. Harold A. Ryerson, Playground Director.

San Francisco, Cal.—A contract for furnishing a locomotive crane to this city was awarded the Norman B. Livermore Co. for $4,200.

Augusta, Ga.—The contract for the work on the Augusta Canal was let by the Canal and River Commission to J. D. McGee, of Greenville, S. C., for $34,660; this will in-

clude the raising of the bulk heads, raising of canal banks, the concrete walls for the canal bank and the paving of the canal bank. Mr. McGee's bid was so much lower than any of the other bidders on this part of the work that he was asked to appear before the Commission and make good his bid. He appeared, and after going over the bid, he stated that he would accept the canal work at the price he had made, but after considering his bid on the rest of the work he would not consider taking the whole job, but would rather forfeit his $250 he had up. The committee looked into the bid and saw that the canal bid was much lower than any of the rest so he was given the work, but his bond was raised from $5,000 to $15,000. This he says he will furnish.

The rest of the work will be at Hawk's Gulley and the paving of the river bank. The bids on this work will be further considered within ten days. This deferring was done on account of the Commission desiring to have a conference with the C. & W. C. railroad officials, and Col. Dan C. Kingsman. The bids on the rest of the work show up as follows: C. E. Teague, $10,500; A. J. Twiggs, $17,000; W. J. Oliver, $16,060, and McKinzie, $20,000. The Commission will take up the rest of the work in a few days and all of the contracts will be cleaned up.

Boston, Mass.—Canvass of bids for excavating a new channel for Alewife Brook, Spy Pond to Mystic River, Belmont, Cambridge, Arlington and Somerville, received by the Metropolitan Park Commission, May 19, John R. Rablin, Engineer. Awarded to Auguste Saucier.

Bidders	140,000 cu. yds. Excav.	Totals
William H. Ellis, Boston	$0.83	$116,200.00
Antonio G. Tomasello, Dorchester	.83	116,200.00
Charles R. Gow Co., Boston	.80	112,000.00
B. Perini Co., Ashland	.77	107,800.00
Bruno & Paqtitti, Boston	.65	91,000.00
John J. Falvey, Somerville	.63½	88,900.00
Coleman Brothers, Boston	.60	84,000.00
Coughlin & Shiels Co., Boston	.58	81,200.00
Auguste Saucier, South Framingham	.32½	45,500.00

Fitchburg, Mass.—The contract for remodeling City Hall has been awarded to J. D. Littlehale, of this city, who immediately began work upon the job; the contract price was $18,417, being very near the estimate of Superintendent Kirby. The contract provides that the work must be completed by August 18, and that for each day which the contractor exceeds that limit he shall forfeit $10 to the city. On the other hand, he is to receive a bonus of $10 for each day that he finishes the contract inside the time limit.

Greenville, Miss.—The Board of Mississippi Levee Commissioners has awarded contracts for the construction of about 800,000 cu. yds. of levee work as follows:

Above Greenville, Stokes place, to R. L. Leonard & Co., 6,200 yds., at 16.7c. per cu. yd.

Rosedale, to R. L. Leonard & Co., 6,000 yds. at 23c.

Lower end of Waxhaw, riverside enlargement, to R. L. Leonard & Co., 11,500 yds., at 24.95c.

Landside Berm, lower end of Waxhaw, to R. L. Leonard & Co., 2,500 yds., at 24.95c.

Shady Side Bayou, riverside enlargement, 71,500 cu. yds., to Lowrence Bros., at 29.9c.

Jenkins to Mound, riverside enlargement, 78,000 cu. yds., to Lowrence Bros., at 22.9c.

Below Greenville—Greenville to La Grange, riverside enlargement, 100,000 cu. yds., to Helgason, Clarke & Parker, at 15.4c.

From station 140 to 210, Greenville to La Grange, to Helgason, Clarke & Parker, 50,000 cu. yds., at 16.87c.

Warfield to Refuge, 238,000 cu. yds., to Helgason, Clarke & Parker, at 18.87c.

Below Stella, 58,000 cu. yds., to J. G. Sessions, at 19.98c.

Fitlers to Hays, 90,000 cu. yds., to J. G. Sessions, at 19.44c.

Hays to Shiloh, 120,000 cu. yds., to R. L. Leonard & Co., at 26.95c.

Brooklyn, N. Y.—Bids were received May 21 by Allen N. Spooner, Commissioner of Docks, for preparing for and building new pier between 31st and 32d sts.: Harry R. Wheeler, 23 Clinton st., Brooklyn, $174,587; George W. Rogers, $209,000; Snare & Triest, $183,820; E. DeV. Thompkins, $261,000; George R. Spearin, $192,462; Sanford & Brooks, $208,312; Northeastern Construction Co., $223,400; John J. Haggerty, $213,000; P. Sanford Ross, $224,500; Jenks Anderson Co., $197,323; R. P. & J. H. Staats, $196,725; Phoenix Construction Co., $195,897.

New York.—Bids were received as follows on May 17 by John F. Ahearn, President borough of Manhattan, for repairs and alterations to baths and pontoons for the free floating baths; repairing and painting the roofs and painting free floating baths. N. B. Smythe, 1123 Broadway, $13,600; Perry Dry Dock Co., $14,175; George F. Stewart, foot Twenty-sixth Street, Brooklyn, $13,499; all bids have been rejected.

Troy, N. Y.—Two proposals for spraying trees have been received; Samuel E. Hale, of this city, agreed to spray the trees in the public parks and streets for $3.50 each, while Schonmaker & Son, of Albany, asked $4 per tree for the same work; bids were referred to the Commissioner of Public Works.

Charleston, S. C.—Bids were received for constructing the battery boulevard, consisting of a sea wall 4,000 feet long, with necessary drains and filling, about 667,000 cu. yds., the six lowest bidders being as follows:

	Wall and Drains.	Filling.
Bowe & Page	$134,818	$71,187
Coastwise Dredging Co.	160,977	86,430
Tucker & Vinton	164,494	62,933
McLean Contracting Co.	158,726	75,375
Simons, Mayrant Co.	167,830	62,310
R. Sanford Ross	.....	64,320

The lowest bidder, Bowe & Page, stated that they had made an error and asked to be allowed to withdraw their bid. The Committee of Council having the matter in charge recommended that Bowe & Page be allowed to withdraw their bid, and that if the contract be awarded at all, it should be upon the combined figures of the McLean Contracting Co. and the Simons-Mayrant Co., and under one contract as follows:

First—For sea wall, $35 per cu. ft.

Second—For filling, 9.3c. per cu. yd.

Third—For concrete drain, $10.34 per ft., with two manholes, at $16.20 each.

Fourth—For terra-cotta drain, $5.11 per ft., with two manholes, at $91.72 each.

Fifth—For transporting cobbles, 58c. per yard, and shell for 45c. per yard.

Sixth—For barricade, $15 per ft.

Unless it be possible to secure a lump sum contract either for the filling or for the sea wall, based upon estimates now in the City Engineer's office, in which event your Committee would recommend that such lump sum contracts be made in lieu of the above figures.

Seventh—Your Committee would further recommend that the Mayor be authorized to accept said bids and sign a contract for this work, in a form approved by the Corporation Counsel, based upon the aforesaid figures, either with the McLean Contracting Co. and the Simons-Mayrant Co. jointly, or with the McLean Contracting Co., after it has made satisfactory arrangements with the Simons-Mayrant Co., guaranteed by a surety company bond for 30 per cent of the price to be paid. Provided that the city can make satisfactory arrangements regarding the sale of its bonds. The report was adopted.—R. G. Rhett, Mayor.

TRADE NOTES

Cast Iron Pipe.—Chicago: There is little new business in sight outside of routine orders, but heavy shipments are going forward from the foundries. Birmingham: Manufacturers are busy with orders booked some weeks ago. Quotations: 4-inch, $24. New York: The city will ask bids, June 9, for 14,400 tons of pipe for extension of high-pressure system and 1,000 tons of other iron and steel. General demand is good, though orders are not large. Quotations: 6-inch, carload lots, $23.50.

Lead.—The market is stronger than last week. Sales have been made in New York at 4.40 cents and in St. Louis at 4.30 cents. The American Smelting and Refining Company continues to quote shipment lead in 50-ton lots at 4.30 cents, but its shipping schedule is much delayed and orders booked now will probably be shipped during the latter part of June or early in July. Competent judges of the situation express the belief that higher prices will be named when the tariff situation is cleared up.

Diesel Engines.—The following announcement has been made by Adolphus Busch, of St. Louis, Mo.:

My faith and confidence in the superiority of the Diesel engine over all others is supreme. The fuel economy of the Diesel engine, as is demonstrated by the continuous operation of nearly 30,000 horsepower installed in the United States and more than 350,000 horsepower in the world, shows the superiority of the Diesel engine over any other prime mover. If operating instructions are followed, 7½ gallons of crude or fuel oil will be sufficient to develop 100 B. H. P. per hour when running anywhere between full and half load. Feeling assured that with the proper organization the sale of this magnificent engine can be developed to wonderful proportions, I have personally purchased for cash the patents, patent rights, good will and all unincumbered physical assets of the American Diesel Engine Co., and have established general offices in the South Side Bank Bldg., St. Louis, Mo.

It is my intention to organize and finance a company in St. Louis in the near future, and in the meantime the business will be conducted in the name of Adolphus Busch, purchaser of American Diesel Engine Co., and will be managed by skilled and efficient experts at the location named above, where we will be pleased at all times to receive our friends. In case of trouble with engines now in service, we are prepared to send experts experienced in handling Diesel engines, and we are also prepared to furnish all repair or spare parts upon receipt of order. All orders or inquiries for engines, as well as repair or spare parts, will receive prompt attention.

New Engineering Firm.—The Electro-Mechanical Engineering Bureau has recently opened offices in the Monadnock Block, Chicago, Ill., for consultation, inspection and tests along mechanical, electrical and chemical lines. They are in a position to give expert attention to any technical subject, including the development and design of devices, processes and patentable ideas.

Boston, Mass.—Canvass of bids for grading, surfacing and other work, Mystic Valley Parkway and Mystic River Reservation, from High st. to Main st., Medford, Somerville and Arlington, received by the Metropolitan Park Commission, May 17, awarded to James H. Fannon, Somerville, by John R. Rablin, Engineer.

Bidders	10,000 Cu. Yd. Earth Grading	6,450 Lin. Ft. 10" Vit. Pipe	970 Lin. Ft. 12" Vit. Pipe	800 Lin. Ft. 18" Vit. Pipe	50 Cu. Yd. Portl'd Cement Conc.	109 Catchbasins	2,300 Lin. Ft. straight Edgestone	1,610 Lin. Ft. Curved Edgestone	4,500 Cu. Yd. Loam Surfacing	3,500 Cu. Yd. Loam to be Furn. byCont.	60,000 Sq. Yd. Rdway. Surfacing	18,000 Sq. Yd. Walk Surfacing	1,250 Sq. Yd. Granolithic Surfacing	Totals
John A. Gaffey, Medford	$0.60	$0.45	$0.55	$0.90	$12.00	$43.00	$1.35	$1.75	$0.43	$1.50	$0.90	$0.60	$1.60	$96,392.50
Coughlan & Shiels Co., Boston	.43	.45	.53	.80	7.00	40.00	.98	1.25	.50	1.50	.96	.55	1.45	95,063.60
John E. Palmer, Boston	.70	.40	.60	1.20	9.00	35.00	1.10	1.60	.35	1.70	.70	.35	2.50	80,359.00
*John J. Falvey, Somerville	.60	.30	.40	1.00	10.00	50.00	1.00	1.20	.40	1.30	.60	.30	1.80	69,996.00
Bruno & Petitti, Boston	.45	.45	.60	1.20	8.00	40.00	1.00	1.60	.40	1.00	.57	.40	1.60	68,240.50
Peter F. Connolly, Jamaica Plains	.49	.45	.48	.73	8.00	34.00	.98	1.40	.35	.95	.56	.27	2.00	63,939.50
Richmond F. Hudson, Melrose	.45	.35	.40	1.00	9.00	30.00	1.00	1.40	.40	1.00	.55	.30	1.50	62,676.50
Rowe Conrtacting Co., Brighton	.30	.35	.45	.75	7.00	30.00	1.00	1.30	.30	1.20	.57	.30	1.69	62,175.00
Wm. J. McCarthy Co., Somerville	.35	.40	.50	.90	10.00	28.00	1.00	1.25	.30	1.25	.54	.30	1.75	61,711.20
Coleman Brothers, Boston	.40	.40	.50	.80	9.00	30.00	1.00	1.25	.30	1.20	.50	.30	1.35	59,397.00
J H. Fannon, Somerville	.35	.40	.50	.90	8.00	28.00	1.00	1.25	.30	.90	.48	.30	1.40	56,188.70

Water Company Reorganized.—The control of the Consolidated Water Company of Utica, N. Y., passed into new hands last month, when the New Jersey General Securities Company transferred to W. S. Bacot and Richard U. Sherman a majority of the common and preferred stock of the company. The transfer gives the new owners absolute power in regard to all the company's affairs. A reorganization of the company will probably follow within a short time. Mr. Bacot and his brothers, John V. Bacot and R. W. Bacot, have been connected with the company continuously for a number of years, but they have not latterly exercised a controlling influence. It is understood that they will now be active in the new management and that W. S. Bacot will again become a resident of Utica. Mr. Bacot is an expert engineer and has had much to do with the development of the company's plant. Mr. Sherman is a son of Vice-president Sherman. The present head of the company is E. L. Gardner, who has acted for the New Jersey General Securities Company, but has visited Utica only occasionally. C. K. Corbin, the present vice-president, has been the chief resident official. It is promised in behalf of the new management that a much more liberal policy will prevail in the future than has been the case in the past. In regard to the litigation that is pending regarding the validity of the contract between the company and the city it is asserted that whatever the result the company cannot be seriously damaged. It will still have its property and as this comprises all the easily available sources of water supply in the vicinity, it will be necessary for the city to make a new contract or to take over the company's plant as a municipal enterprise.

Float Valve.—F. W. Foster Mfg. Co., 97 Haverhill street, Boston, Mass., manufactures a float valve under the trade name "Never-Leak." It is designed to automatically control the flow of water into a tank and is regulated by the rise and fall of the water in the tank acting on the float. It has few working parts and the float is small. The float is adjusted to water level by a thumb screw, and corrugations on a small wheel allow for adjustment at any desired angle. The valve is guaranteed for clear water working pressure from 5 to 500 pounds.

Announcement.—H. Mueller Mfg. Co., 254 Canal street, New York, N. Y., announce that on May 1 they opened a branch at No. 37 Dearborn street Chicago, where they will carry a stock of Mueller Plumbing, Water and Gas Goods. This is diagonally across the street from the old location. About a year ago they opened an office at No. 48 Dearborn street, and carried only a limited assortment of samples of Mueller goods. During this time many requests have been made that they carry a stock in Chicago for the convenience of the Chicago and suburban trade. In complying with these requests it was necessary to move to their new location.

Bankrupt Contractor.—J. W. Curry, of Parkersburg, W. Va., a local sewer contractor who does a large amount of work, has filed a voluntary petition in bankruptcy. Liabilities, $20,000; assets, $35,000.

Removal Notice.—The Petroleum Iron Works Company, Sharon, Pa., having erected a new works at Sharon, Pa., have closed their works at Washington, Pa., and removed their main office to Sharon.

Location of Water Meter.—Since the extensive adoption and use of the water meter the question as to the proper place to locate it, whether outside or inside of the premises, has been carefully weighed and considered by every water works manager, and while there is some difference of opinion at the present time, the general preference is given to the universal outside setting, owing to its many advantages, a few of which may be enumerated as follows:

First—Inasmuch as some meters must be placed outside, by placing them all in this manner a systematic plan of setting is had and maintained.

Second—A great deal of time is saved in the reading and repairs to meters. In the Clark meter box the meter is read in twenty seconds. The meter can be taken out of the box and a new one placed, all joints made and the box securely locked, in fifty seconds' time.

This great saving in time means a great reduction in operating expenses, which is a big item where there are thousands to read every month.

Third—Absolute protection from frost and damage of all kinds; protection to your consumer from burglars gaining admission to the house under guise of meter readers.

Fourth—The detection of underground and all other leaks in the entire service pipes.

In the selection of the meter box it is important to have one of strong construction that will withstand the heaviest street traffic, that presents a neat appearance in the nice boulevard or lawn and elsewhere; that fits in the lawn, or concrete or paved walk or street; that is adapted to all kinds and sizes of meters, with a lid having a secure, quick operating, reliable locking device, that the meter may be read in the least possible time; a box sufficiently large to allow at all times all necessary repairs to be made inside of box (leaky pipes and fittings) without the necessity of digging up the entire setting; simplicity in construction, avoiding all unnecessary complications in mechanical devices. All of the above features and a good many more good points are embodied in the Clark meter box, the result of 18 years of practical experience with meters placed underground under all conditions. This box is made in different sizes and shapes to meet every requirement. It is manufactured by the H. W. Clark Company, 117 South Seventeenth street, Mattoon, Ill.

Big Bridge Contracts.—The Massillon Bridge and Structural Company, Massillon, O., has closed contracts which will keep the plant in operation the remainder of the year. The largest contract is for dock sheds along the Mississippi River at New Orleans, for which 1,300 tons of steel will be required. Another contract with the Benton Harbor & St. Joseph Street Railway and Light Company, of Benton Harbor, Mich., is for a street railway viaduct 420 feet long. The company has the contract for repairing the famous Eads and Merchants' bridges across the Mississippi River at St. Louis belonging to the Terminal Railroad Company, which will require 300 tons of steel. A contract recently closed calls for the use of 100 tons of steel for highway bridges in Oklahoma.

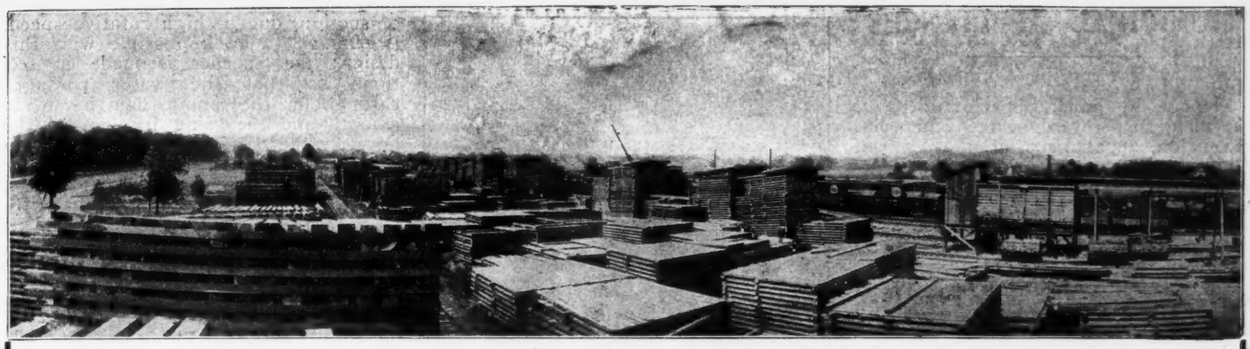
Macon Paving Brick.—The first paving brick turned out from the W. H. Jones brick yard, Macon, Ga., have been exhibited in the city. About 90 per cent of the kiln are said to have been vitrified and suitable in all respects for street paving. It is probable that many of the bricks will be used in paving Washington avenue and other streets.

Auto Fire Engine.—The machinery of the Luitwieler Pumping Engine Company, which is to begin operations in Rochester, N. Y., this month, in the buildings formerly occupied by the American Laundry Machinery Company, 123-125 Ames street, has been shipped from Los Angeles, Cal., and is now on the way. The company has been building non-pulsating, continuous stream power pumps for the past five years, but now the plant is being moved to Rochester, and, besides the power pumps, automobile fire engines will be constructed. The company is capitalized at $1,000,000, and Rochester men interested in the concern are Samuel B. Williams, W. C. Smith, besides L. W. Luitwieler, formerly of Rochester. Great possibilities are said to be contained in the pump, which will be attached to the automobile fire engine. It will be provided with sliding friction gears, so that absolute control of the pressure of the water may be had at all times. It is said by the use of the combination pump and transmission gear with a 60-horsepower engine a stream of 600 gallons of water a minute may be thrown, which can instantly be cut down to 300 gallons or still further reduced to 150 gallons a minute. The same pressure can be maintained at the pump on the smaller streams, so that on a 300-gallon stream the nozzle pressure would be about twice that of the 600-gallon stream and on the 150-gallon stream it would be nearly four times as great as that maintained under the 600-gallon schedule. This is a new departure in the manner of construction of fire fighting apparatus, as where great height is required all that has to be done is to reduce the size of the stream.

Contractors' Supplies and Equipment.—The Barron & Cole Company, 125 Franklin street, New York, N. Y., has been incorporated to succeed James S. Barron, who for the past two years has been Eastern and export agent for the Twentieth Century Grader and sole agent for the Peerless Pick-up Hand Sweeper. The company is the agent for the Petrolithic Road Company, Los Angeles, Cal., and can supply rolling tampers, oil sprinkling wagons and gang rooter plows. The new company is also the agent for Mims concrete machinery and can supply the Mims measuring machine for use with any type of mixer.

Metallic Packing.—The Federal Metallic Packing Company, 137 High street, Boston, Mass., manufactures a metallic packing which, it is claimed, will cut packing bills in half and reduce packing troubles to a minimum. The material is made in two forms—fibered metallic packing and flexible metallic twist. The fibered packing is a shredded metal for throttle valves, globe valves, stop valves, angle valves, blow-off valves, etc. It is made of a soft metal, which cannot score a rod, and lasts almost indefinitely. Flexible metallic twist is a product similar in appearance to soft twisted packing, but made up of metallic tubes enclosing fibrous material to give flexibility and compressibility.

Dumping Wagons.—The Watson Wagon Company, Canastota, N. Y., recently made a shipment of wagons, crated, to Federico Boillat, Buenos Ayres, Argentine. The shipment was on a rush order, all the negotiations regarding it having been conducted by cable. The makers claim that there are more Watson wagons in use than there are of all other makes combined.



Our North Yard at Grenada, Miss., with 3,000,000 feet of paving block stock on hand, which insures prompt delivery of all orders, and provides air-seasoned lumber for the manufacture of all blocks on orders placed with

Ayer & Lord Tie Company

Railway Exchange,

Write for Booklet. Chicago, Ill.

A Sure Water Supply

¶ Pure, wholesome water delivered by Compressed Air under guarantee to save **25%** to **50%** in operating.

¶ Equipment for all conditions of pumping from deep wells, rivers, creeks, lakes, mines and sewerage. Estimates furnished without charge.

Write for Catalogue

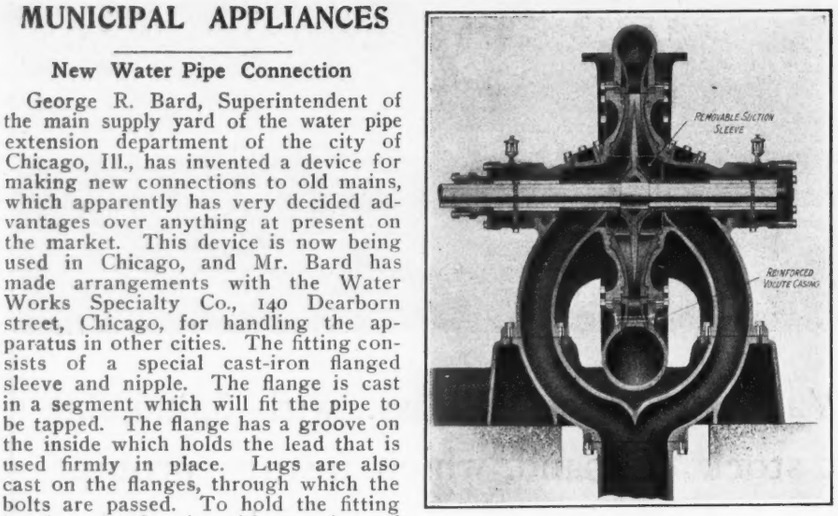
HARRIS AIR PUMP CO. INDIANAPOLIS, INDIANA

MUNICIPAL APPLIANCES

New Water Pipe Connection

George R. Bard, Superintendent of the main supply yard of the water pipe extension department of the city of Chicago, Ill., has invented a device for making new connections to old mains, which apparently has very decided advantages over anything at present on the market. This device is now being used in Chicago, and Mr. Bard has made arrangements with the Water Works Specialty Co., 140 Dearborn street, Chicago, for handling the apparatus in other cities. The fitting consists of a special cast-iron flanged sleeve and nipple. The flange is cast in a segment which will fit the pipe to be tapped. The flange has a groove on the inside which holds the lead that is used firmly in place. Lugs are also cast on the flanges, through which the bolts are passed. To hold the fitting in place on the pipe either a piece of flat flexible chain or a strip of band iron is used. In making the connection a valve is usually first fastened to the nipple, the pipe where tap is to be made cleaned off and the whole fastened to the pipe as mentioned before. Between the fitting and pipe is placed a lead gasket which has previously been formed to shape. The straps are tightened up and the fitting is fastened rigidly in place. The cut is made with the regulation Smith tapping machine. If any leak appears it is easily stopped by caulking the lead. The time required in making the connection varies from twenty minutes to one hour depending on the difficulty of the position.

The advantages claimed by the manufacturers for this new device are: The large saving in lead over the old method of using a split sleeve; with the new method all the lead that is necessary is for a gasket suitable to the size of the pipe; this is the same whether the main is 10 inches or 48 inches. With the old method the amount of lead used varied with the size of the main and sometimes ran very high. Furthermore there is a very great saving it is claimed in the time required for placing the fitting. This is of special benefit where the work is to be done in a wet trench. An added advantage is that with less material required in the casting itself there is a saving in cost.



STANDARD TURBINE PUMP

Turbine Pumps

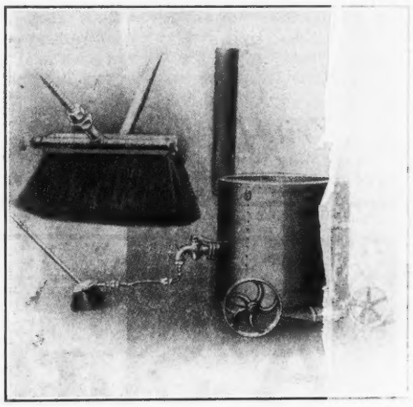
The Atlantic Hydraulic Machinery Company, 1022 Drexel Building, Philadelphia, Pa., has been organized solely for the manufacture of high-grade turbine pumps. The manufacturers claim for their pumps lightness, comparatively low in price, constructed according to latest designs in the best manner, and, above all, high efficiency. They manufacture: Single stage pumps for lifts of from 25 to 125 feet, from 6-inch to 18-inch, capacity from 800 to 7,100 gallons per minute; multi-stage pumps, for direct connection to A. C. motors for lifts up to 700 feet, in sizes from 4 to 12-inch, capacities 300 to 4,200 gallons per minute; high-speed, low-lift pumps, for direct connection to steam turbines and A. C. motors for heads up to 65 feet, in sizes from 8 to 15 inches, capacities 1,500 to 7,100 gallons per minute.

The illustration shows a longitudinal cross-section of a 10-inch Standard turbine pump. The novel features are: The removable suction sleeves, located inside the impeller and the reinforced volute casing; the suction sleeves straighten out the entering stream of water and distribute it all around the outer periphery just before entering the impeller, so that the liquid is transmitted from blade to blade and the phenomena of "cavitation," or decrease of suction, due to high rotative speed, is claimed to be impossible with this design; the impeller is made in sections so that the water passages throughout the pump can be made smooth and the "skin friction" of the liquid, while passing through the pump is reduced to a very low value, the pumps being of the double suction type, require no thrust bearing, but in order to keep the parts in proper alignment there is a substantial bronze collar at the end of the shaft.

NEW PIPE CONNECTION

A Reservoir Tar Broom

Charles H. Waithman, Engineer and Surveyor to the Newmarket, England, Urban District Council, is the inventor of an ingenious device, described as a reservoir tar broom, for treating roads and footpaths with tar, or other liquids. The appliance consists of a reservoir tube which is fixed to the stock of any ordinary broom, and is connected either singly or in duplicate to a tar boiler. Any roadman can rapidly treat the surface, using the brush in the ordinary way, as the boiler is drawn forward. Complete control of the quantity of liquid used is obtained by means of the tap, also complete control of the liquid as it comes in contact with the surface. The liquid is said to be applied



TAR SPREADING BROOM AND RESERVOIR

with ease and rapidity, and the width of surface treated is only governed by the length of flexible tube—9 ft. has been found to be a practical and serviceable length. Screw caps are provided for cleaning the reservoir.

A Polyphase Slide Rule

A novel style of slide rule capable of performing a wide variety of calculations has recently been placed on the market by Keuffel & Esser Co., of New York. It is made in a similar form to the ordinary Mannheim slide rule, being a little wider in order to accommodate an extra scale upon the slide. In addition to the regular *A*, *B*, *C*, *D* and trigonometrical scales of the ordinary slide rule, the Polyphase has on the face of the slide an *inverted C* scale between the *C* and *C* scales, and on the edge of the rule in place of the millimeter scale is placed a scale of cubes.

This arrangement enables squares and square roots, cubes and cube roots and a wide variety of combinations, such as the 4th, 5th, 7th and 11th powers and 6th roots to be taken with one setting of the slide, and the position of the inverted *C* scale on the slide enables many problems involving three factors to be performed at one setting also. The advantage of this arrangement lies not alone in the lessened time for an example, but also in the increased assurance of accuracy.